THE IRON TRADE REVIEW

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HOPEFUL VIEW

ENTERTAINED AT MEETING OF BLAST FURNACE OPERATORS.

Sentiment Improves in the Trade.—Many Manufacturers Ready to Renew Activities.—Lake Season Closes.

A general improvement in sentiment is noticeable in the iron world and substantial evidences of a return of better conditions are not entirely lacking. At the recent meeting of the American Society of Mechanical Engineers in New York, conversation with many manufacturers developed the fact that there is a general eagerness to resume activity as soon as financial conditions permit. Every one seems to be awaiting the time when increased activity will be justified.

Blast Furnace Operations

A meeting of the blast furnace people, making foundry and malleable pig iron and using Lake Superior ores, except those located east of the Allegheny mountains, was held in Cleveland on Saturday last, and a general discussion of business, present and prospective, took place. A committee was appointed to make a careful investigation of the situation, and the report when completed is to be submitted to another meeting to be called for further consideration of the matter. The meeting was entirely harmonious and it seemed to be the general impression of the furnace managers from all the different districts that long depression need not be looked for, and that in the early part of next year considerable inquiry for pig iron could be expected. The productive capacity of the Steel Corporation is practically unchanged from that of a week ago. Fifty-seven furnaces are now idle, leaving between 40 and 45 per cent in operation. Just four years ago when the industry was suffering from a similar depression, only 20 per cent of the Corporation's capacity was active. A few blast furnaces of other companies have been blown out during the week, but no other steel capacity has gone out of commission except in one or two cases in which plants are running intermittently. The check in the curtailment movement may or may not be permanent, depending almost wholly upon the working out of the financial situation. Quotations on northern and southern grades of foundry pig iron are lower, $14 Birmingham and $17 valley being the prevailing prices.

Lake Season Shipments

The season of shipments on the lakes has closed rather suddenly, the total for the season being 41,288,755 tons, an increase of 3,775,160 tons over last year. The December movement was only 90,817 tons, against 540,594 tons December of last year. The United States Steel Corporation shipments for the season amount to 22,600,000 tons, a gain of about 2,000,000 tons over last year.

Structural Material

Several reports of importation of structural shapes from Germany have been in circulation, owing to the reduction in price just announced by the German syndicate. It is true that a careful investigation was made to see whether it would be profitable to attempt importation, but it was decided that it would not. Evidences that the demand for structural material will improve at an early date are noted at several centers, especially in Chicago, where there is a very optimistic feeling among fabricators. The attitude of the Steel Corporation in adhering to its new construction projects has helped the situation. An order for 12,500 tons of structural steel for another open-hearth unit at Gary, Ind., was placed during the week. Bids were opened in New York for 15,000 tons of steel for the Manhattan bridge, and on Saturday bids for 10,000 tons for a New York hotel will receive attention. A number of railway orders for bridge work have been placed.

Improvement in Wire

The demand for wire products shows considerable improvement. Orders for shipment on contracts are taking the place of suspensions and a goodly number of orders from the south and southwest are being received. Woven wire fence and barbed wire are being sold in large quantities. There is some cutting of prices on plates sold by jobbers. Cast iron pipe prices have declined $1 per ton. An order for 2,300 tons of this pipe for Phoenix, Ariz., has been placed. The tin plate business shows continued improvement.

New Rail Specifications

It is understood that the leading interest will within a few days announce new specifications for steel rails for 1908, and it is believed that this action will result in the placing of a fair amount of business. Several trunk lines have already made reservations, but without definite contract. The prices of the new specifications will probably range from $28 to $33 a ton, according to the percentage of crop from ingots.

Coke and Old Material

The output of coke in the Connellsville region is now at the lowest point of the present year and less than one-half that of the week ending Sept. 29, when the high record of the year was made. Independent operators are endeavoring to act harmoniously. There is little demand for foundry coke, and prices are irregular. Very little business is being done in old material and prices continue to sag. Railroads have, however, disposed of some scrap recently.

THE WEEK IN IRON CENTERS

PITTSBURG.

New Rail Specifications—Tentative Reservations Have Been Made.

Office of THE IRON TRADE REVIEW,
521 Park Bldg., Dec. 10.

If there is a superlative degree of inactivity, that is the condition of the local market during the week under review. Sentiment has shown some improvement, but sentiment and business are separate and distinct. Instead of out and out cancellations or suspensions which have been the rule for the past month or six weeks, the past week is noted by a saving clause in many of these suspensions, in which consumers say that they will want the goods sometime after the first of the year, and that this provision is made in order that annual inventories may show up light. While no standard rail business has been done, several of the trunk lines have made tentative reservations of no definite tonnage and no section specification. Sometime during the next week the leading interest will announce a new section specification and range of prices for 1908, the range in price being governed by the percentage of crop from the ingot. This new section is figured upon as being about what the American Association will adopt when it finally gets around to it.

There has been no change worthy of more than passing mention in mill operations, although several of the plants have been operated intermittently, as was noted last week, and others shut down. The finishing mills of the Youngstown Sheet & Tube Co. are running, but the steel plant is closed. Part of the Youngstown plant of Republic Iron & Steel was restarted, but the Brown-Bonnell, which operated last week, is closed and two of the western mills are down. A report of blast furnaces using Lake Superior ore shows that whereas on Nov. 1, 94 per cent were in operation, the week ending Dec. 7 showed only 52 per cent in operation.

While the financial situation generally is reported as convalescent, the Pittsburg district has not undergone any decided change as a result of the curative treatment. Manufacturers report that while customers are still exceedingly cautious, they are not as timid regarding the future as they were two weeks ago, and are beginning to sit up and take notice. This attention is reflected by a small volume of rush order business for immediate requirements.

Pig Iron.—Aside from the sale of 500 tons of northern No. 2 foundry iron at $17 valley furnace, and a few scattered inquiries which are looked upon more as feelers than well intentioned inquiries, the pig iron market is absolutely dead. Producers are not figuring on next year's business, and are not ready to name the price on future business. Buyers on the other hand are exceedingly cautious, and take on only such material as they need for immediate requirements, this consisting entirely of small lots. During the week a merchant furnace outside of the valley districts and presumably an eastern furnace, quoted $16.25 at the furnace for northern foundry iron, but the freight to destination would bring it slightly above the price of valley iron. Bessemer iron is quoted nominally $18.50 to $19 at the furnace, and basic $17.50 to $18 at the furnace. Foundry iron is quoted $17 valley. Southern prices are all out of line, and as far as can be learned no sales upon which an estimate could be made, have been put through in this district. While nothing definite has been done in respect to next year's ore prices it is generally understood that the guaranteed metallic content will be reduced, and this will also make a discussion of a change in prices necessary. For prompt or reasonably prompt delivery we quote the following nominal asking prices:

Bessemer, Valley	$18.50 to 19.00
Bessemer, Pittsburg	19.40 to 19.90
No. 1 Foundry, Pittsburg	18.65 to 19.15
No. 2 Foundry, Pittsburg	17.90 to 18.40
Gray Forge, Pittsburg	17.40 to 17.90
Basic, Valley	17.50 to 18.00
Basic, Pittsburg	18.40 to 18.90

Ferro-Manganese.—There is no demand for alloys and sellers are making no effort to establish a market under present conditions. Ferro-manganese, foreign 80 per cent, is quoted nominally at $48 to $49 delivered Pittsburg.

Imported 50 per cent ferro-silicon is quoted $93 Pittsburg on forward deliveries; domestic 12 per cent, $34; 11 per cent, $33; 10 per cent, $32. The lower grades of imported ferro-silicon are quoted 50 cents lower. These quotations are applicable to Pittsburg territory.

Plates.—Aside from the fact that the steel car companies are taking out their contracts in good shape and have not asked for any extensive suspensions, there are no encouraging features in the market as far as plates are concerned. One of the big steel car companies during the week cancelled a heavy tonnage on an old contract, but placed it back on another, calling for different lengths and widths on account of a change in car specifications by the buying railroad. The railroads, however, are not placing new contracts and car companies are beginning to wonder, as everyone else has been doing, when something new is going to come their way. On account of the light structural business, the plate tonnage that usually goes with shapes to fabricating companies is exceedingly small. Prices are firm, however, and we continue to quote:

Tank plate, ¼-inch thick, 6¼ to 100 inch, 1.70c f. o. b. mill Pittsburg. Extras are as follows per 100 pounds: Boiler and flange steel plates, 0.10c; A. B. M. A. and ordinary firebox steel plates, 0.20c; still bottom steel, 0.30c; marine steel, 0.40c; locomotive firebox steel, 0.50c; all sketches, excepting straight taper plates varying not more than four inches in width at ends, narrowest end not being less than 30 inches, 0.10; circles, 0.20c. Plates in width over 100 inches up to 110 inches, 0.05c; over 110 inches up to 115 inches, 0.10c; over 115 inches up to 120 inches, 0.15c; over 120 inches up to 125 inches, 0.25c; over 125 inches up to 130 inches, 0.50c; over 130 inches, 1.00c. Gages under ¼-inch to and including 3/16-inch plate on thin edges, 0.10c; under 3/16 to and including No. 8, 0.15c; under No. 8 and including No. 9, 0.25c. Five cents extra for less than carloads. Terms, net cash in 30 days.

Sheets.—The demand for sheets is slow all along the line and including all departments. Both the leading interest and independent manufacturers are operating at a minimum. The only new business is on rush orders for quick shipment. There are large tonnages on the books, but it is practically all under suspension. Prices remain unchanged and we continue to quote:

Black steel sheets, one pass, cold rolled, Nos. 11-12, 2.20c; Nos. 13-14, 2.25c; Nos. 15-16, 2.30c; Nos. 17-21, 2.35c; Nos. 22-24, 2.40c; Nos. 25-26, 2.45c; No. 27, 2.50c; No. 28, 2.60c; No. 29, 2.75c; No. 30, 2.85c; galvan-

ized Nos. 10-11, 2.65c; Nos. 12-14, 2.75c; Nos. 15-16, 2.85c; Nos. 17-21, 3.00c; Nos. 22-24, 3.15c; Nos. 25-26, 3.35c; No. 27, 3.55c; No. 28, 3.75c; No. 29, 4.00c; No. 30, 4.25c; blue annealed, No. 10 and heavier, 1.85c; Nos. 11-12, 1.90c; Nos. 13-14, 1.95c; Nos. 15-16, 2.05c. Corrugated roofing, $1.90 per square for No. 28 painted, 2½ inch corrugation, and galvanized, $3.25 per square for No. 28.

Tin Plate.—The tin plate business, which showed its first big improvement last week, has continued along the same lines and there are indications of a resumption of buying by consumers who have been delaying this action as long as they possibly could and be sure of their supply next spring. Many mills that have been down for a considerable period have resumed. We continue to quote:

Coke tin plate, 100-pound basis, 14 x 20, $3.90 f. o. b. mill, Pittsburg district. Terms, 30 days, less 2 per cent for cash in 10 days.

Rails and Track Material.—With the understanding that the leading interest during the present week will announce new rail section specifications for 1908, there is a feeling that this action will stimulate business to a slight extent at least. Rail capacity has been reserved at the request of several of the trunk lines without definite contract, and it is understood that the prices on the new specification will range from $28 to $33, according to the percentage of crop from the ingots. The Edgar Thomson plant has been running heavier during the past week than at any time since it was "gaited" at the beginning of the depression. The light rail tonnage has been small, and is equivalent during the week to but little more than one day's full capacity. We quote as follows on present section specifications:

Fifty-pound and heavier, 500-ton lots and over, $28; carloads and less than 500 tons, $30; less than carload lots, $32; 8-pound, $38; 12-pound, $34 to $37; 16-pound, $32; 20-pound, $31; 25 to 45-pound, $30; angle splice bars for standard sections, $1.65; standard spikes, $1.90 Pittsburg; hand spikes, $2 to $2.05 Pittsburg.

Steel.—The sale of 2,000 tons of Bessemer billets to an eastern concern is the only transaction of importance in semi-finished steel reported during the week. Six plants of the Carnegie Steel Co. are still down and the mills reported out last week have not been resumed. The Brown-Bonnell plant of the Republic company operated last week, but is down again this week. We hear of no shading on the nominal $28 market price on Bessemer and open-hearth billets. Axle and forging billets, and sheet and tin bars are still quoted $31 Pittsburg.

Hoops and Bands.—This business is very light. There is no new buying and consumers who usually place their contracts between Dec. 1 and the first of the year have given no indication of their intention this time. There has been no change in prices and we quote:

Hoops in carload lots, 2c; in less than carload lots, 2.10c; bands, 1.60c; base half extras as per standard steel.

Merchant Bars.—There has been no change in this market, and aside from a few small orders for quick delivery against contracts previously specified and suspended, no new business is reported. There have been a few releases of this kind, but the aggregate tonnage is very small in comparison with a normal week's business. There is no talk of shading prices on either iron or steel bars. Manufacturers express the opinion that a reduction in price would in no way stimulate business, but would have a tendency to still further weaken the situation. We continue to quote:

Common iron bars, 1.60c to 1.65c Pittsburg in carload lots and over, 1.65c to 1.70c in less than carloads; 1.60c base Pittsburg, plus freight to point of shipment on western deliveries; Bessemer steel bars, 1.60c net for future deliveries; 1.85c to 1.95c out of stock; plow and cultivator, 1.60c net; channels, angles, zees, tees, under three inches, 1.70c, all f. o. b. Pittsburg. The following differentials are maintained on steel: Less than 2,000 pounds, 0.10c advance; less than 1,000 pounds of a size, 0.30c advance. Cold rolled and ground shafting, 50 per cent off in carloads, and 45 per cent in less than carloads, delivered in base territory; open-hearth spring steel, 2.25c to 2.50c; sleigh shoe flats, 1.60c to 1.65c; smooth finished machinery steel, 1.90c to 2c; toe calk, 2.10c to 2.15. Planished and machine straightened tire steel is 1.80c base. Iron finished tire under 1½ by 1½ inches, 1.75c; iron finished tire 1½ to ½ inches and over, 1.60c base. All tire subject to ½ extra on the steel card.

Structural Material.—Aside from the 16,000 tons of material entering into the construction of approaches of the Manhattan bridge at New York, there are no big inquiries out. The contract for the main structure of the bridge was let a year ago. Fabricators are cutting prices on the small business offered in order to keep organizations together, but several big companies have their drafting forces either laid off entirely or working short time. The financial situation has held up practically all contemplated building and mills report no new business. Construction companies are using up their stocks. We continue to quote:

Beams and channels, 15-inch, and under, 1.70c; over 15 inches, 1.90c; zees, 1.70c; tees, 1.75c, angles from three to six inches inclusive, 1.70c; over six inches, 1.80c; universal and sheared plates, 6¼ inches and wider, 1.80c base.

Merchant Pipe.—There has been no change in this market for several weeks. New business is very light, but there is still some of it going on every day, mostly in small lots, but nevertheless moving. As in other lines, suspensions of shipping specifications have been numerous and resulted in several mills either closing down temporarily or running on short time. There is no talk of shading prices on steel pipe, although there is a range from $4 to $6 per ton on iron pipe by independent manufacturers with comparatively small outputs. We continue to quote the following official discounts of the leading interest to consumers in large lots:

	—Steel—	
	Black.	Galv.
⅛ and ¼ inch	65	49
⅜ inch	67	53
½ inch	69	57
¾ to 6 inches	73	63
7 to 12 inches	70	55
EXTRA STRONG PLAIN ENDS.		
⅛ to ⅜ inch	58	46
½ to 4 inches	65	53
4½ to 8 inches	61	49
DOUBLE EXTRA STRONG PLAIN ENDS.		
½ to 8 inches	54	43

Boiler Tubes.—Repetition becomes monotonous. There is no change; business is light; the semi-annual contracting period begins about Jan. 1, and prices are unchanged, the following discounts being firmly maintained:

	Iron.	Steel.
1 to 1½ inch	42	47
1¾ to 2¼ inch	42	59
2½ inch	47	61
2¾ to 5 inch	52	65
6 to 13 inch	42	59

2¼ inches and smaller, over 18 feet, 10 per cent net extra.
2¾ inches and larger, over 22 feet, 10 per cent net extra.

Wire Products.—The wire situation is a puzzler for the manufacturer and analysis is exceedingly difficult. The slump did not strike this trade until long after all others had been affected, and then everything fell off with a bump. There is a little business, but it is of a miscellaneous nature and slight. Prices are unchanged as follows:

Wire nails, jobbers' carload lots, $2.05; retailers' carload lots, $2.10; less

than carloads, $2.15; painted barb wire, $2.20 for jobbers in carloads; retailers in carloads, $2.25; and less than carload, $2.35; with 30c for galvanizing; plain wire, 1.90c for jobbers, and 1.95c by carload.

Coke.—The production of coke in the Connellsville region has reached the lowest point of the year. It is less than one-half the high mark reached during the week ending Sept. 29, when the estimated shipments were 429,127 tons. During that week, according to the *Connellsville Courier*, the number of ovens in blast was 33,195 out of a total of 34,850, or leaving 1,655 out of blast. For the week ending Nov. 23 the total number of ovens is given as 35,454; number in blast, 23,724; out of blast, 11,730; production, 207,154 tons. For the week ending Nov. 30, the total number of ovens in the region is given as 35,454; in blast, 22,465; out of blast, 12,989; production, 210,323 tons. There is a little demand for foundry coke and some has been sold into next year at $2.75 at the ovens. Prompt foundry coke is quoted $2.80 at the ovens. Furnace coke is nominally quoted in absence of sales at $2.00 to $2.15 at the ovens.

Old Material.—Aside from the railroad lists, no scrap is moving except in exceedingly small lots being taken up by shorts who are covering at the present low prices. The Pennsylvania lines, east, and Baltimore & Ohio have not sent out their lists, but the lines west sold their No. 1 wrought at about $13. In the absence of sales, we continue to quote the following nominal market, gross tons, delivered in the Pittsburg district:

Heavy melting scrap, $13.50 to $14; re-rolling rails, $15 to $15.50; bundled sheet scrap, $11 to $11.50; iron axles, $21 to $21.50; old iron rails, $18 to $19; No. 1 wrought scrap, $14.50 to $15; old car wheels, $20 to $20.50; low phosphorus scrap, $18 to $18.50; machine shop turnings, $7.50 to $8; cast borings, $6 to $7; No. 1 cast scrap, $15 to $16.

Receives Government Orders.—The Bury Compressor Co., Erie, Pa., has recently received an order from the Japanese navy for one 350-foot belt-driven air compressor and also an order from the navy department of France, for a direct connected motor driven air compressor. The company also recently shipped the navy yard, Brooklyn, one of its steam driven type of air compressors, for U. S. Ship Panther, sailing with the Pacific squadron.

CHICAGO.

Better Tone of Market—Increased Interest in Pig Iron.

Office of THE IRON TRADE REVIEW,
1362 Monadnock Block, Dec. 10.

An increase in the number of inquiries and a considerably larger number of sales, though still in moderate tonnages, together with a much freer movement of currency and an almost normal condition as regards collections, have given to the market of the week just ending a much more elastic and healthy tone. Reinstatements are beginning to supersede extensions and cancellations in volume and a strong and apparent authoritative belief exists that the evidences of the week are trustworthy signs of permanent improvement. Plant operations, however, continue to remain in a condition of comparative stagnation. Interest in pig iron is stronger, but prices and transactions are an uncertain quantity. Store trade in finished materials has been the feature of the week, but the continuance of rapidly depleted stocks will sooner or later result in a strong demand for mill shipments, of necessity, it would seem, shortly after the opening of the new year. There is a pretty general weakness in prices with a few exceptions. Cast iron pipe is quoted off $1 a ton and scrap prices continue to sag. A tremendous tonnage of railroad scrap has been offered of late and this week nearly 17,000 tons has been listed. The future for structural material seems bright.

Pig Iron.—The week has brought out reports of the lowest prices quoted thus far and at the same time has been a pronounced improvement in the kind and quantity of inquiry for iron for the first quarter and the first half. Inquiries for tonnages which in the aggregate reach a very considerable volume have been received, it is understood, and a sufficient opening up of the prospect for the next quarter has developed to keep in blast some furnaces which it was expected a few weeks ago would be out by this time. It is the general opinion that this is a substantial convalescence preceding a complete though gradual recovery. Extensions granted in October and November which brought forward shipments for December delivery are not being further drawn out and iron is moving in very fair volume. Some large tonnages have been spoken of as purchased in this district at prices materially below $15 Birmingham basis. Whatever the status of these reports may be, they have not established a market price any more certainly than has been true for weeks past and the source of the iron is as vague as the price. The nominal quotation, at which it is also known some small quantities of iron have been sold, continues to remain, therefore, at $15 Birmingham for No. 2 southern. Northern iron can be had at a corresponding figure. We quote for all delivery at Chicago as follows:

Lake Superior Charcoal	$25.00 to 25.50
Northern Foundry No. 1	20.00 to 20.50
Northern Foundry No. 2	19.00 to 20.00
Northern Foundry No. 3	18.50 to 19.00
Southern Foundry No. 1	19.85 to 20.35
Southern Foundry No. 2	19.35 to 19.85
Southern Foundry No. 3	18.85 to 19.35
Southern Foundry No. 4	18.35 to 18.85
Southern No. 1 Soft	19.85 to 20.35
Southern No. 2 Soft	19.35 to 19.85
Southern Gray Forge	18.85 to 19.35
Southern Mottled	18.35 to 18.85
Southern Silveries, 4 per cent Silicon	24.35 to 24.85
Southern Silveries, 5 per cent Silicon	25.35 to 25.85
Southern Silveries, 6 per cent Silicon	26.35 to 26.85
Jackson Co. Silveries, 6 per cent	30.40
Jackson Co. Silveries, 8 per cent	32.40
Jackson Co. Silveries, 10 per cent	34.40
Malleable Bessemer	22.50 to 23.00
Standard Bessemer	20.15 to 20.65
Valley Basic	20.85 to 21.35
Alabama Basic	21.35 to 21.85

Billets and Rods.—The local situation with regard to billets is practically unchanged except for a strengthening of the probability that a weakening in price is imminent. At present forging billets command from $33 to $35 Chicago, one local mill quoting nothing less than $35. Some inquiry appears for next year's delivery, but it is of indefinite character in most instances. We quote f. o. b. Pittsburg, rolling billets, $28; Bessemer wire rods, $37; open-hearth rods, $38 and sheet bars $31 to $31.50.

Merchant Bars.—Locally the mill price on iron bars has been very firm. Prices on bars from store have not been held so stiff. The condition of the mills in this district has remained practically unchanged with the larger part of the capacity idle. Such operations as are being carried on simply cover current orders for prompt shipment and the inquiry for future tonnage is still very light. We quote for carload lots Chicago delivery as follows:

Bar iron, 1.75c to 1.78c; soft steel bars and bands, 1.78c, half extras; soft steel angles, less than 3 x 3, 1.88c; hoops, 2.18c base, full extras; planished or smooth finished tire steel, 1.98c; iron finish, up to 1½ x ½ inch, 1.93c base; iron finish, 1½ to 1½ inch and larger, 1.78c base; channel for solid rubber tire, ¾ to 1 inch, 2.28c, and 1⅛ inch and larger, 2.18c; smooth finished machinery steel, 2.18c; flat sleigh shoe, 1.83c; concave and convex sleigh shoe, 1.93c; cutter shoe, 2.36⅛c; toe calk steel, 2.33c; railway spring, 1.98c; crucible tool steel, 7c to 9c, with higher prices asked on special grades. Quotations on shafting are 54 percent off the list f. o. b. Pittsburg for carload

lots, and 48 per cent off for less than carload lots. On iron and steel bars from local stocks, we quote as follows: Bar iron, 2.10c, full extras; soft steel bars $2 per 100 pounds base, plus half extras; soft steel hoops, 2.40c, full extras.

Plates.—The store price for No. 8 plate up to 60 inches wide is quoted $2 a ton lower than a week ago. Store trade is the only active feature of the market and mills are content to work up what is left of back orders. We quote:

Plates, ¼-inch and heavier, 6¼ to 100 inches wide, either universal or sheared, 1.70c Pittsburg base. For extras see Pittsburg report. Freight rate to Chicago, 18c per 100 pounds for carload lots, and 21c for less than carload lots. Jobbers' prices for shipment from local stocks are as follows: Tank steel, ¼ inch and heavier up to 72 inches wide, 2.20c; 3/16 inch up to and including 60 inches wide, 2.30c; 3/16 inch, 72 inches wide, 2.55c; No. 8 up to 60 inches wide, 2.30c. Flange steel, 25c extra; heads, 25c extra.

Sheets.—There was fairly good buying in a small way during the week and trade with the jobbers was characterized by an increasing briskness. Jobbers' stocks are very low and many orders pass from one to the other to be filled. We quote:

Black sheets, Nos. 8, 9 and 10, 1.90c Pittsburg; No. 28, 2.60c Pittsburg. Galvanized sheets, No. 28, 3.75c Pittsburg. Freight to Chicago, 18c per 100 pounds for carload lots, and 21c for less than carload lots. Jobbers' prices on carload lots and less from store are as follows:

No. 10, 2.30c to 2.35c; No. 12, 2.35c to 2.40c; No. 14, 2.40c to 2.45c; No. 16, 2.50c to 2.60c; Nos. 18-20, 2.70c to 2.80c; Nos. 22-24, 2.75c to 2.85c; No. 26, 2.80c to 2.90c; No. 27, 2.85c to 2.95c; No. 28, 2.95c to 3.05c; No. 30, 3.25c to 3.35c. Galvanized sheets, Nos. 10 to 16, 3.20c to 3.30c; Nos. 18 to 20, 3.30c to 3.40c; Nos. 22 to 24, 3.45c to 3.50c; No. 26, 3.65c to 3.70c; No. 27, 3.85c to 3.90c; No. 28, 4.05c to 4.10c; No. 30, 4.70c to 4.90c.

Structural Material.—Every evidence points to a quicker recovery in the direction of structural material than in any other line. While it is well known that some contracts are being held back in anticipation of lower prices and others because of financial conditions, there is a marked optimism among fabricators. Instances where prices previously quoted have been stiffened during the past week are reported. The Steel Corporation has supported the situation very materially by its firm disposition to continue new construction. An order for 12,500 tons of structural steel for another open-hearth unit at Gary was placed this week. The American Bridge Co. received an aggregate tonnage of 14,000 while inquiry and plans submitted for estimate are coming in daily from all parts of this territory. It will not be unexpected if an unusual quantity of money finds its way into building enterprises in the coming year. It is expected that the contract for the structural material for the Commonwealth Edison plant will be let this week. We quote:

Beams and chanels, 3 to 15 inches inclusive, 1.70c Pittsburg. For extras see Pittsburg report. Freight rate from Pittsburg to Chicago, 18c per 100 pounds for carload lots, and 21c per 100 pounds for less than carload lots. Quotations from store are as follows:

All angles, 3 inches and larger, including 6 inches, $2.05 per 100 pounds; angles, over 6 inches, $2.15 per 100 pounds base; beams, 3 to 15 inches inclusive, $2.05 per 100 pounds base; channels, 3 inches and larger, $2.05 per 100 pounds base. Less than carload lots are $1 a ton higher than foregoing prices.

Rails and Track Supplies.—The contracting for 35,000 tons of rails by the Union Pacific railroad is reported and it is understood that the order was divided between the Carnegie Steel Co. and the Illinois Steel Co. Further than this the amount of business in sight is negligible. Mills, however, have ample tonnages to carry them well past the first of the year. Prices are not very firm at the figures and a slight shading on light sections and spikes might be named. We quote:

Bessemer rails, $28 to $30; less than 500-ton lots, $32; open-hearth rails, $29; light rails, Bessemer, 25 to 45-pound sections, $32; 20-pound, $33; 16-pound, $35; 12-pound, $35; and lighter sections down to 8-pound, $42, all f. o. b. mill. Track supplies vary in price according to quantity and delivery. On orders accompanying rail contracts for future delivery, we quote, f. o. b. Joliet; Angle bars, 1.65c; spikes, 2.00c to 2.10c; bolts with square nuts, 2.50 to 2.60c; with hexagon nuts, 2.75c. For carload lots or less, for prompt shipment, the following prices are asked: Angle bars, 2.25c to 2.75c; spikes, 2.40c to 2.50c; bolts with square nuts, 2.85c; with hexagon nuts, 3c.

Cast Iron Pipe.—The closing of the contract for 2,300 tons of pipe for the city of Phoenix, Ariz., constituted the only letting of the weak. It went to the American Cast Iron Pipe Co. of Birmingham. The placing of the Chicago tonnage leaves only the Tucson, Ariz., letting to be heard from and that has been again delayed. A concession of $1 a ton on all sizes of pipe is quoted this week and prices are as follows: Four-inch water pipe, $34; 6 to 12-inch, $33; larger sizes, $32; gas pipe, $1 a ton higher.

Merchant Pipe and Boiler Tubes.—Store trade in boiler tubes has been a feature during the week and a tonnage of good volume changed hands. Mill orders, however, are light as most of the movement is from stock. These stocks are very low and there should be with anything like an encouraging prospect a fairly normal buying movement after the holidays. On black steel pipe some local jobbers are quoting 72 per cent.

We quote mill discounts, Chicago delivery, carload lots, as follows: On steel pipe, jobbers are allowed a concession of one point and five per cent additional from the schedule in force.

	Steel. Black.	Galv.
¾ to 6 inches, inclusive	71.2	61.2
BOILER TUBES.		
	Steel.	Iron.
2¾ to 5 inches, inclusive	62.2	49.2

Mill quotations on iron pipe are from four to five points higher than above. A concession of one point from the following quotations is allowed by Chicago jobbers on carload orders for shipment from local warehouse stocks. We quote for less than carload lots as follows:

MERCHANT PIPE.	Black.	Galv.
⅛ to ¼ inch	61	45
⅜ inch	63	49
½ inch	65	53
¾ to 6 inches	69	59
7 to 12 inches	65	50

Minimum prices for wrought iron pipe, carload lots or greater, from Chicago stocks, are as follows: ⅛-inch to ¼-inch, 55; ⅜-inch, 57; ½-inch, 59; ¾-inch to 6 inches, 64; 7 inches to 12 inches, 59. Boiler tubes from store are unchanged at 60 off for steel, 47½ for iron, and 47½ for seamless, base sizes, 2⅛ inches to 5 inches.

Wire Products.—A much brighter aspect prevails in the condition of wire products trade. Reinstatements are increasing in number and exceeding cancellations, which are on the decrease. From the south and southwest inquiries and orders are coming in in very fair volume and, with the strengthening of cotton prices which seems to be forecasted, a continued increase is looked for. Woven wire fence is being bought in unusually

large quantities and barb wire is in good demand. A year's business of moderate volume only is expected, but restoration to a more normal demand from the existing situation is looked for early in the new year. Mills of the leading producer are reported as supplied with orders that will carry them for 60 days. We quote to jobbers, Chicago delivery:

Wire nails, $2.23; painted barb wire, $2.38; galvanized barb wire, $2.68; smooth annealed wire, $2.08; smooth galvanized wire, $2.38; polished staples, $2.23; galvanized staples, $2.63. Carload lots to retailers, 5 cents higher; less than carload lots, 15 cents higher.

Coke.—A firmer tone has made itself evident among coke producers, but at the same time operating forces are being diminished and wage reductions are reported. The supply in this district remains as a week ago. We quote Connellsville 72-hour foundry coke at $2.85 to $3 and standard Connellsville furnace coke at $2 to $2.25.

Old Material.—There is no life in the scrap market and the prices quoted are for the most part without substantiation in actual buying. An extremely large quantity of railroad scrap has been offered in the past month, but it has been absorbed very slowly and scattered among a greater number of buyers. This week some additional offerings have been listed amounting to nearly 17,000 tons, including 12,000 tons from the Baltimore & Ohio, 3,000 tons from the Atchison, Topeka & Santa Fe, 1,300 from the Wabash, and 500 from the Wisconsin Central. Of the B. & O. list 3,500 tons was steel rails and about 1,700 tons railroad wrought. We quote gross tons in the first paragraph as follows:

Old Car Wheels	$19.50 to 20.00
Old Iron Rails	15.50 to 16.00
Re-rolling Rails (3 ft. and over)	13.00 to 13.50
Old Steel Rails (3 ft. and under)	13.00 to 13.50
Light Section Relayers, 45 lbs. and under, subject to inspection	21.00 to 23.00
Relaying Rails, subject to inspection	19.00 to 19.50
Frogs, Switches and Guards	11.75 to 12.25
Heavy Melting Steel	11.75 to 12.25

We quote net tons as follows:

No. 1 R. R. Wrought	$10.75 to 11.25
No. 2 R. R. Wrought	9.75 to 10.25
Knuckles, Couplers and Springs	9.75 to 10.25
Shafting	15.50 to 16.00
Iron Car Axles	17.00 to 17.50
Steel Car Axles	17.00 to 17.50
Dealers' Forge No. 1	9.00 to 9.50
Pipes and Flues	8.00 to 8.25
No. 1 Cast, 150 lbs. and less	13.00 to 13.50
No. 1 Mill	7.50 to 8.00
Mixed Busheling (Nos. 1 and 2)	7.50 to 8.00
Country Sheet	6.00 to 6.50
No. 1 Boiler Cut	7.50 to 8.00
Boiler Punchings	11.00 to 11.50
Cast Borings	5.50 to 6.00
Mixed Borings, etc	5.50 to 6.00
Machine Shop Turnings	7.00 to 7.50
Railroad Malleable	10.50 to 11.00
Agricultural Malleable	10.00 to 10.50
Stove Plate and Light Cast Scrap	11.75 to 12.25
Old Iron Splice Bars	13.00 to 13.50

CLEVELAND.

Complete Ore Movement for Season Shows Large Increase—Market at Standstill.

Office of THE IRON TRADE REVIEW,
Browning Building, Dec. 10.

Iron Ore.—A brief period of activity in lake ore shipments in December, has ended, bringing with it the close of the season's movement for 1907. The complete figures of shipment show a total of 41,288,755 tons to have been brought down since the opening of navigation last spring, compared with a total of 37,513,595 tons in 1906, an increase of 3,775,160 tons. With the all-rail shipments, it is expected that the 42,000,000 mark for the year will be reached, establishing a new high record for ore movement in a single season. Of this total, the fleet of the United States Steel Corporation carried 22,600,000 tons, compared with 20,645,148 tons in 1906, a gain of nearly 2,000,000 tons. As was anticipated, the December ore traffic by lake was very light, aggregating but 90,817 tons, against 540,594 tons in December, 1906, a loss of 449,777 tons.

Operations in the mines have ceased for the winter and the last boats to load at upper lake ports are now en route to discharge their final cargoes. There is a great quantity of ore on lower port docks and shipping orders from furnaces usually received at the end of the season are conspicuously few this year.

The figures for the month of December and the entire season follow:

Port—	Dec., 1906.	Per cent of total.	Dec., 1907.	Per cent of total.
Escanaba	134,778	24.93	39,572	43.57
Marquette	47,814	8.65	4,466	4.92
Ashland	54,551	10.09	14,396	15.85
Superior	103,679	19.18	13,204	14.54
Duluth	122,043	22.57	.....	.....
Two Harbors	77,729	14.38	19,179	21.12
Total	540,594	100.00	90,817	100.00

Port—	Season 1906.	Per cent of total.	Season 1907.	Per cent of total.
Escanaba	5,851,050	15.60	5,761,988	13.95
Marquette	2,791,033	7.44	3,013,826	7.31
Ashland	3,388,112	9.03	3,437,672	8.32
Superior	6,083,057	16.22	7,440,386	18.02
Duluth	11,220,218	29.91	13,445,977	32.57
Two Harbors	8,180,125	21.80	8,188,906	19.83
Total	37,513,595	100.00	41,288,755	100.00

The movement for November, this year and last, is as follows:

Port.	Nov., 1906.	Per cent of total.	Nov., 1907.	Per cent of total.
Escanaba	748,912	20.06	469,373	11.29
Marquette	233,933	6.27	307,547	7.40
Ashland	284,500	7.61	319,438	7.69
Superior	626,633	16.78	679,237	16.34
Duluth	1,142,959	30.61	1,537,438	36.99
Two Harbors	697,223	18.67	843,043	20.29
Total	3,734,167	100.00	4,156,076	100.00

	To Dec. 1, 1906.	Percent of total.	To Dec. 1, 1907.	Percent of total.
Escanaba	5,716,272	15.46	5,722,416	13.89
Marquette	2,743,219	7.42	3,009,360	7.30
Ashland	3,333,561	9.02	3,423,277	9.31
Superior	5,979,378	16.17	7,427,182	18.03
Duluth	11,098,175	30.02	13,445,977	32.64
Two Harbors	8,102,397	21.91	8,169,727	19.83
Total	36,973,002	100.00	41,197,939	100.00

Pig Iron.—As production continues to be diminished, and to that extent the technical position of the market is improved, furnace interests are displaying a little more confidence in their attitude. Though there is considerable scattering inquiry for first quarter in from 300 to 500-ton lots, especially for the eastern furnaces, operators are inclined not to take them seriously and are showing reluctance to make quotations. Sales are so meager as to leave one in doubt as to the true state of the market, and the nominal price of $18 furnace for No. 2 foundry does not firmly establish the present basis of transactions. Some carload sales for prompt shipment are reported at that figure, however, and there is talk of making $18 furnace the price for foundry iron for first half. The Cleveland market for prompt delivery is about $18.50 local furnace, one sale to a valley melter equivalent to that basis being reported. The sale of 200 tons of malleable at $18.50 furnace is also noted. Bessemer shows little activity. Basic continues extremely quiet, and the Struthers Furnace Co. this week will blow out its Anna stack at Struthers, O., until conditions improve. The stack of the Upson Nut Co. in this city, making foundry iron, will also go out Friday for several weeks for repairs. Collections have become quite a serious problem to some interests, and condition of credits in a number of cases is forestalling sales. We quote, f. o. b. Cleveland, for prompt shipment, as follows.

Bessemer	$19.90
No. 1 Foundry	18.50 to 19.00
No. 2 Foundry	18.00 to 18.50
No. 3 Foundry	17.50 to 18.00
No. 2 Southern	18.35 to 18.85
Gray Forge	18.50 to 18.75

Coke.—Conditions in coke are unchanged, and many ovens are continuing to go out of action. The plant of the Struthers Coal & Coke Co., comprising about 200 ovens, was closed indefinitely this week. Prices are nominal, and we quote foundry coke at from $2 to $2.50 ovens for prompt shipment, and high grade furnace coke at $3.25 with $2.75 for inferior brands.

Finished Material.—There is but little substantial improvement in finished lines upon which to base expectations of renewed activity. The sentiment has undoubtedly become more settled as curtailment of production has proceeded, but new business is very light. The waiting game between producers and buyers, the former holding prices firm and the latter unwilling or unable to close for requirements, continues. Trade is at

a practical standstill as regards new tonnage. There is an inclination on the part of buyers to put off talking business until after the first of the year, and accordingly sellers' eyes are now trained somewhat anxiously upon that period. Some small structural contracts are pending, and we note the inquiry for 500 tons of plates. The bar iron situation has changed to the extent that both the Empire and Union mills in this city are again operating with sufficient orders to insure their activity for several weeks. There is a little better inquiry in jobbing lines.

Old Material.—Though it is believed that the bottom in old material prices is being approached, prices continue to decline in a number of grades. Buying is not heavy and in some respects the market is nominal. The monthly accumulation of railroads, amounting to upwards of 10,000 tons, was disposed of at about the basis of prices herewith quoted. A small tonnage, however, was withheld, the roads declining to sell on the terms offered. We have revised our prices, and quote f. o. b. Cleveland, gross tons, as fololws:

Old iron rails	17.00 to 18.00
Old steel rails (re-rolling)	13.00 to 14.00
Old steel rails (under 6 feet)	13.00 to 14.00
Old car wheels	17.00 to 18.00
Old steel boiler plate	9.00 to 10.00
Steel axles	14.00 to 15.00
Malleable iron (railroad)	12.00 to 13.00
Malleable iron (agricultural)	10.00 to 11.00
Heavy steel	11.00 to 12.00
Country mixed steel	11.00 to 11.50
Low phosphorus	15.50 to 16.50

We quote net tons as follows:

No. 1 R. R. Wrought	11.50 to 12.50
No. 1 busheling	11.00 to 11.50
No. 1 machine cast	12.00 to 13.00
Iron axles	17.00 to 18.00
Axle turnings	7.00 to 8.00
Machine shop turnings	5.50 to 6.50
Grate bars	10.00 to 11.00
Pipes and flues	9.00 to 10.00
Tank iron	8.00 to 9.00
Hoop and band iron	5.00 to 6.00
Sheet iron	4.00 to 5.00
Wrought drillings	5.50 to 6.50
Stove plate	10.00 to 11.00
Cast borings	4.00 to 5.00

CINCINNATI.

Southern Pig Iron Again Declines—No Change in Northern.

Office of THE IRON TRADE REVIEW, First National Bank Bldg., Dec. 10.

Pig Iron.—Further recession in prices is to be noted this week and southern No. 2 foundry is obtainable at $14.00 Birmingham for prompt shipment. Inquiry is exceedingly limited and no specifications for important tonnages not next year's delivery are under consideration. It is said that the inquiry from a Michigan melter calling for 2,500 tons was reduced to an order for 500 tons of southern iron at $13.75 Birmingham for No. 2 foundry for December delivery. The inquiry for 1,000 tons of malleable and the tonnage of foundry iron wanted by an agricultural implement manufacturer are still pending. Buyers show no interest in the market and southern furnaces are apparently more inclined to give favorable consideration to firm offers on any business that may be submitted. The low grades are dull and it is conceded that $12.00 Birmingham could be done on gray forge with No. 4 foundry obtainable in the neighborhood of $12.50. Northern iron in the southern Ohio district appears to be pegged at $18.00 furnace for No. 2 foundry under the generally accepted conclusion that this figure is so near the cost line that it would be better policy to blow out the furnace than to continue operations under conditions that would not admit of sales at this price. It was currently rumored that one southern interest had sold a large tonnage for next year's delivery at a price below anything yet quoted, but this was denied. The melt of foundry iron in this territory is reported as exceedingly light and melters express an unwillingness to specify tonnage for next year until the demand for product resumes in sufficient volume to justify purchases of raw material. We quote for prompt delivery, delivered Cincinnati, as follows:

Southern Foundry No. 1	$17.75 to 18.25
Southern Foundry No. 2	17.25 to 17.75
Southern Foundry No. 3	16.75 to 17.25
Southern Foundry No. 4	15.75 to 16.25
Southern No. 1 Soft	17.75 to 18.25
Southern No. 2 Soft	17.25 to 17.75
Southern Gray Forge	15.25 to 15.75
Northern No. 1 Foundry	19.70 to 20.20
Northern No. 2 Foundry	19.20 to 19.70
Northern No. 3 Foundry	18.70 to 19.20

Finished Material.—Specifications on contracts are exceedingly light and a considerable tonnage will be carried over into next year. New business is insignificant. Retail orders are moderate, but there is no change in prices. Small orders from stock are filled here at the following prices:

Angles, 3 x 3 and over, 2.15c to 2.25c; beams and channels, 15 inches and under, 2.15c; small angles and architectural channels, 2.10c base; plates ¼ inch and heavier, 2.10c; 3-16 inch, 2.20c; No. 8, 2.20c; sheets (blue annealed) No. 10, 2.30c; No. 12, 2.35c; No. 14, 2.40c; No. 16, 2.50c; box annealed sheets, Nos. 18 and 20, 2.65c; Nos. 22 and 24, 2.75c; Nos. 25 and 26, 2.80c; No. 27, 2.85c; and No. 28, 2.95c. Iron and steel bars, $2 base; boiler tubes, 62 per cent off base; turnbuckles, 45 per cent off; rivets, 3.15c base; cold-rolled shafting, 45 per cent off list; steel tire, 2.10c base.

Coke.—The market continues exceedingly quiet with no material change in prices. A little business has been done in the way of figuring on next year's contracts for furnace coke, but the transactions are mainly confined to scattering small lots of foundry coke, which is ordered from the ovens as needed. There is apparently not enough business to justify having coke in transit for prompt delivery calls. Prices in the leading coke producing districts are as follows:

	PER TON
Wise County Furnace Coke	$2.30 to 2.50
Wise County Foundry Coke	2.85 to 3.00
Pocahontas Furnace Coke, prompt shipment	2.25 to 2.35
Pocahontas Foundry Coke	2.75 to 3.00
Connellsville Furnace Coke, prompt shipment	2.30 to 2.50
Connellsville Foundry Coke	2.90 to 3.25
New River Foundry Coke, prompt shipment	3.00 to 3.10
New River Furnace Coke, contract	2.75 to 2.90

Old Material.—The market continues dull and weak with some quotations lower. We quote dealers' prices here as follows:

Old No. 1 R. R. wrought, net tons	$12.00 to 12.50
Cast machine and fdy., net tons	13.50 to 14.50
Old iron rails, gross tons	17.50 to 18.50
Old steel rails (re-rolling) gross tons	14.50 to 15.50
Old short lengths, gross tons	14.50 to 15.50
Old iron axles, net tons	18.50 to 19.50
Heavy melting scrap, gross tons	14.00 to 14.50
Stove plate, net tons	10.50 to 11.50
Wrought turnings, net tons	7.50 to 8.50
Cast borings, net tons	5.50 to 6.50
Car wheels, gross tons	18.50 to 19.50

PHILADELPHIA.

Pig Iron Prices Are Still Sagging and Furnaces Are Being Blown Out.

Dec. 10.

Pig Iron.—The market continues largely nominal, with buying reduced apparently to the lowest figures. There is a little inquiry regarding orders for 1908, but producers are reluctant to commit themselves until such factors as the prices of ore and labor are more clearly to be grasped. Curtailment in production continues vigorously, and a number of additional furnaces have been blown out in the last few days. These include the Princess and Victoria furnaces at Glen Wilton and Goshen, Va., and the Sheridan furnace, in the Lebanon valley. It is also reported that the Burden Iron Co.'s furnace at Troy, N. Y., will be blown out very soon. Other shut-downs are in contemplation, and some of them will doubtless be carried out before Jan. 1. By that time it is doubtful if more than 25 per cent of the productive capacity of eastern Pennsylvania will be in operation. Prices sag slowly with the prevailing uncertainty in business, and in some grades show another reduction of 25 cents. They may be quoted as follows:

No. 1X Foundry	$19.00 to 19.50
No. 2X Foundry	18.50 to 19.00
No. 2 Plain	18.00 to 18.50
Standard Gray Forge	16.50 to 17.00
Basic	17.50 to 18.00
Low Phosphorus	25.00 to 26.00

Finished Material.—There is very little new business coming forward, and mills continue to be operated on

reduced time or closed down altogether until orders enough come in to justify their operation again. Collections are reported very poor in all quarters, with no indication of improvement in the immediate future. Prices show no change and may be quoted as follows: Beams, channels and angles, according to specifications, 1.85c to 1.90c; refined iron bars, 1.75c to 1.80c; steel bars, 1.75c to 1.85c; plate, 1.85c to 1.90c.

Old Material.—Conditions are stagnant, and the only encouraging feature is that prices have not declined greatly during the past week. Stove plates are off $1 a ton. It is almost needless to say that the mills are buying nothing. Prices show a few changes, as follows.

Old steel rails	$14.00 to 15.00
No. 1 steel scrap	12.00 to 12.50
Old steel axles	19.50 to 20.00
Old iron axles	22.00 to 23.00
Old iron rails	17.50 to 18.00
Old car wheels	18.50 to 19.00
Choice scrap R. R. No. 1 wrought	14.50 to 15.00
No. 1 yard scrap	13.50 to 14.00
Machinery scrap	16.00 to 16.50
Low phosphorus scrap	16.50 to 17.00
Wrought iron pipe	12.00 to 12.50
No. 1 forge fire scrap	11.50 to 12.00
No. 2 forge fire scrap, ordinary	9.00 to 9.50
Wrought turnings	10.00 to 10.50
Axle turnings, heavy	11.00 to 11.50
Cast borings	7.75 to 8.25
Stove plates	12.00 to 12.50

NEW YORK.

Prices on Finished Materials Being Well Maintained.

Office of THE IRON TRADE REVIEW, Room 1005, No. 90 West St., Dec. 10.

Pig Iron.—Although the actual tonnage placed during the past week has been so limited and scattered as not to be a safe indication to the trend of conditions, current inquiry is heavier than a week ago and there are other indications that the situation has materially improved. A hopeful tone prevails in regard to 1908 business, as a general, though doubtless curtailed resumption of activities, is expected after the turn. So far as can be learned, prices are no lower and furnaces are doggedly resisting further declines which would carry the selling price below the cost of production. A careful inquiry as to the condition of the casting industry in the east indicates that the present melt is probably 50 per cent of normal, this figure holding good for the New York district and New England particularly. Exception must be made for a strip along the Hudson river, most of the foundries in which are still running close to full time. Where pig iron requirements had been covered up to the first of the year, the decreased melt means that a considerable tonnage of high priced iron will be carried over; in fact, the rule is that foundry yards are well supplied. In a good many instances, however, purchases will have to be made shortly. A number of lots ranging from 500 tons down have been sold, at about the $17, furnace, level for No. 2X, and there are inquiries in circulation for a number of larger amounts. Eastern Pennsylvania reports the sale of 10,000 tons of basic. We quote, tidewater delivery, as follows.

Northern Foundry No. 1	$18.00 to 18.50
No. 2X Foundry	17.00 to 17.50
No. 2 Plain	16.50 to 17.00
Malleable	19.00 to 20.00
No. 2 Southern Foundry	19.00 to 20.00
Basic	17.00 to 17.50

Ferro-Manganese.—A 100-ton inquiry is current, but otherwise the market is without feature, the price continuing on the level of $49 at the seaboard.

Finished Materials.—Four bids were submitted for the construction of the New York approach to the Manhattan bridge, that of J. C. Rodgers, a local contractor, being lowest; 15,000 tons of steel are involved and it is probable that the city will have work rushed on this project, as bridge facilities are badly crowded. Bids will close Saturday on the construction of a large hotel in this city requiring almost 10,000 tons. Recent awards include a postoffice and court house at Atlanta, Ga., to Charles McCall, a Philadelphia contractor; 1,100 tons bridge work for the Lake Shore; 350 tons to the King Bridge Co., bridge work on the Lake Shore; 500 tons, and on the Boston & Maine 100 to the American Bridge Co. Besides, inquiries are in for a 1,200-ton hotel job at Seattle. In prospect work which may be expected to develop at various times during the new year, there are local projects aggregating perhaps 70,000 tons of steel. Financial conditions will largely determine when or whether this will be placed.

The rail situation, so far as this district is concerned, is unchanged. A Cuban concern is inquiring for 1,000 tons of standard sections. Prices on all lines of finished materials are being maintained in a remarkable manner. There is no cutting discoverable in plates, though competition for business is brisk, and dependable grades of bar iron are procurable only at the full base price, though occasional concessions in the matter of extras are reported. Some 600 tons of plates will be closed this week for flume work upstate. We quote:

Angles, 3 to 6 inches x ¼-inch and heavier, 1.86c; beams, 3 to 15 inches, 1.86c; tees, 3 x ¼-inch and heavier, 1.91c; plates, carloads, tank, 1.86c; marine boiler, 2.26c; bar iron, 1.76c; soft steel bars, 1.76c; sheet, No. 28, black, 2.60c.

Old Material.—The market is absolutely lifeless, transactions being so infrequent that it is scarcely possible to secure accurate quotations. Railway lists are of fair size and the awards upon their offerings will be watched with interest as establishing the current figure in a number of lines. Mills have practically stopped buying. We quote New York delivery, gross tons, as follows:

Old iron rails	$20.00 to 20.50
Old steel rails, re-rolling	15.50 to 16.00
Relaying rails	23.00 to 23.50
Old car wheels	19.50 to 20.00
Old iron car axles	17.00 to 17.50
Old steel car axles	15.50 to 16.00
Heavy melting steel	10.50 to 11.00
No. 1 railroad wrought	13.50 to 14.00
Iron track scrap	12.50 to 13.00
Wrought pipe	10.00 to 10.50
Cast borings	5.50 to 6.00
Wrought turnings	7.50 to 8.00
Heavy cast scrap	15.00 to 15.50
Railroad malleable	14.50 to 15.00
Agricultural malleable	15.00 to 15.50
Stove plate	11.50 to 12.00
Grate bars	11.50 to 12.00

ST. LOUIS.

Furnaces Not Satisfied With Low Offers Made by Buyers.

Dec. 9.

Pig Iron.—Quotations as authorized by some furnace interests in Alabama are $14.50 to $15, Birmingham basis for No. 2. Buyers are insisting that that grade can be obtained at $14 f. o. b. furnace. Offers submitted at prices ranging from $14 to $14.50, Birmingham for No. 2, covering 500 to 600 tons for shipment during December were rejected by one furnace, which evidently expects prices to advance, otherwise it would have taken in the business at the prices offered, as it has tonnage on yards aggregating 3,000 to 5,000 tons, of the grades covered by the inquiries in question.

Our prices, f. o. b. Birmingham, to which $3.75 freight is to be added, follows:

No. 1	Southern	$14.50 to 15.00
No. 2	Southern	14.00 to 14.50
No. 3	Southern	13.50 to 14.00
No. 4	Southern	12.50 to 13.00

Coke.—Very little new business was reported last week in the way of orders for foundry and furnace coke, and there is absolutely nothing stirring in the way of orders for smelter. Most of the large smelters in the southwest have made resales of large tonnages due on contracts at sacrificed prices.

Foundrymen are taking in coke in a satisfactory manner and doubtless there will be new business placed early in 1908 for shipment over the first half of the year. Our quotations range as follows:

Best 72-hour Connellsville foundry, $3.25 to $3.50; low sulphur 48-hour

furnace, $2.25 to $2.50; smelter, $1.60 to $2.15. The freight to East St. Louis is $2.80 per ton, and to St. Louis, $2.90.

West Virginia coke, 72-hour, is still quoted at from $3 to $3.25 f. o. b., ovens, with freight rate of $2.80 to East St. Louis, $2.90 to St. Louis, and $2.40 when destined to points beyond.

Finished Material.—New building has been at a standstill since the financial flurry was first suspicioned, and practically will remain so until money matters become easier. St. Louis banks are paying out currency in limited amounts. Financiers in the Mississippi valley freely assert that conditions will soon become normal, and that building will be resumed.

Old Material.—No change has taken place in the scrap iron market. Prices are very low, and local dealers are very much discouraged.

BUFFALO.

Lackawanna Structural Mill May Resume—Few Pig Iron Sales.

Office of THE IRON TRADE REVIEW, 932 Ellicott Square, Dec. 9.

Pig Iron.—The general sentiment here is that business will pick up the first of the year and furnace and foundrymen, as one of their number expressed it, are looking forward to that date as though it were their twenty-first birthday. There has been some improvement during the past week, but sales are few and small and for immediate delivery only. While a cheerful hopefulness pervades the trade, the feeling being that improved financial conditions will bring relief, there is a general disposition to await developments.

It is understood that the structural mill of the Lackawanna Steel Co. will resume operations next week, though this is said to be contingent upon improvement in market conditions.

It is difficult to form a judgment as to prices, owing to a lack of substantial orders, but it is felt, in view of the situation, that the following quotations are justifiable:

No. 1X Foundry	$19.00 to 19.50
No. 2X Foundry	18.50 to 19.00
No. 2 Plain	18.00 to 18.50
No. 3 Foundry	17.75 to 18.25
Malleable Bessemer	18.50 to 19.00
Gray Forge	17.50 to 18.00
Charcoal	25.00 to 26.00

BIRMINGHAM, ALA.

Plants of the Southern Steel Co. Will be Closed—Demand for Steel.

Dec. 9.

A further curtailment of production in pig iron and steel will take place this week in the Birmingham district when the plants of the Southern Steel Co. are shut down. The receivers decided on this move a week or two ago, the material on hand being practically used up. A statement will be made to the creditors of the company on Dec. 13, when it is believed steps will be taken to remove the affairs of the company from the courts. A disintegration of the various properties, a resumption of the former concerns which were taken into one big organization, or a general organization with all the properties kept intact is suggested. The production of pig iron in the Birmingham district will go considerably under 100,000 tons during December.

There is still strong hope that immediately on the turn of the year the iron and steel market will pick up and that the demand will show some activity. A little inquiry has been received here, but no business has developed as yet. The two interests, the manufacturers and the consumers, appear to be practically dead, both waiting for a general change in conditions throughout the country. Shipments of pig iron from this district are in small lots and far between. The local melt has been reduced some also, in fact, the consumption in the state has been reduced 50 to 75 per cent in the three last weeks.

Ensley, the steel suburb of Birmingham, is the busiest place of all. The Tennessee Coal, Iron & Railroad Co., is adding labor to its forces in construction and other departments in this place. The shutting down of the steel rod, wire and nail mills of the Southern Steel Co. at Ensley will throw a large number of men out of employment. Everything else at Ensley, however, is giving employment to a larger number of men right along and there is a demand for all the steel being produced. Work on enlarging the steel rail mill will be rushed. Ground has been broken for a foundry and machine shop at Ensley and the Tennessee company expects to do much of the work that is now being sent elsewhere.

BRITISH IRON MARKET.

Depression Growing Worse—Pig Iron Market Is Demoralized.

Office of THE IRON TRADE REVIEW, Prince's Chambers, Corporation St., Birmingham, Eng., Nov. 30.

The week has been altogether a period of disquiet and disturbance. The pig iron market seems to be entirely disorganized. At the beginning of the week, there was a sharp advance in Cleveland pig iron, which was entirely wiped out on Wednesday. On Thursday there was an influx of iron into stores, which is a new experience. But the tendency is still in the way of reduction, consumption being in excess of the output. Over 20,000 tons of iron have been taken out of stock this month, and the shipments have been the best ever recorded in November. Up to Thursday, the amount sent out was 123,860 tons, although there were two days still left in the month, against 123,792 tons for the whole of November last year. The amount in store is now 96,644 tons, of which 89,149 are No. 3. Today's quotation for Cleveland iron is 49s 4d ($12.08), representing a fall of about 6d on the day. For the present, forward buying is entirely at an end. In the event of a recovery, this will be an advantage, but at present there is no confidence. The hematite trade is feebler than ever and, although prices are down 13s 6d ($3.30) with a quotation for mixed numbers of 70s ($17.14) consumers complain that this figure is beyond them. Although the demand for pig iron in the Midlands is still pressing, there is no new buying and sellers are competing for orders. For example, although the nominal quotation for Northampton is 56s ($13.70), a contract was closed on Thursday at 50s ($12.24), a figure which caused some consternation among competitors.

The depression in the iron trade is steadily increasing, although in the Midlands a number of works have orders enough to keep them going to the end of the year. There has been a little revival in galvanized sheets, some substantial orders having come in. But in the black sheet line a few mills have been laid off, and the plate trade is rather quiet. As far as actual operations are concerned, the trade is doing wonderfully well; but in steel, prices are falling rapidly, and increasing quantities of Belgian and German material are coming in. In the north of England, makers are manifestly doing much worse than in this district, so many ship building yards being practically without orders. It is considered certain that much northern iron will shortly be coming into the Birmingham district to compete with the local products. There is a consensus of belief also that Belgian and German billets will shortly arrive in large quantities. Some makers would not regret this, as their trade has been badly hit by the high prices of British-made billets. But the steel manufacturers express their determination to cut British prices to any extent that may be necessary in order to meet German competition. Most of the local works will be all right until the end of the year for orders, but the old

phrase, "After that, the deluge," has been repeatedly used in regard to New Year prospects. It seems certain that the January quarterly meeting will see a scramble for orders at much lower prices. The only obstacle to this will be the dearness of raw materials and specially of coal.

METAL MARKET

NEW YORK.

Dec. 10.

Copper.—As has been the case for some weeks past, buying for export account has made up the bulk of the week's business, but even this is falling off and the local situation is extremely quiet. Manufacturers are not now inclined to purchase supplies of any kind except for immediate requirements. The price level is about the same: 13½c to 13¾c for lake, 13c to 13½c for electrolytic and 12¾c to 13¼c for casting.

Pig Tin.—There is no improvement in the market, spot metal being obtainable at 30c to 30½c. The demand for early delivery is not so active as a week ago.

Pig Lead.—The market is still sagging under the combined effect of pressure to sell and no purchasing demand. The metal can now be had on the basis of 4c, New York.

Spelter.—Conditions here are much the same as in the lead market. There is little buying, much effort to liquidate and a steady reduction in prices. We quote 4.40c to 4.45c, New York, and 4.25c to 4.35c, St. Louis.

Antimony.—Prices are lower and the market has lost something of its former scanty activity. We quote: Cookson's, 10c to 10½c; Hallett's, 9¼c to 9¾c; ordinary brands, 8c to 8½c.

CHICAGO.

Dec. 9.

The weakness in lead and spelter has been very pronounced and tin though strongly supported has fallen off in price this week. Demand for metals is extremely light and the market is very soft. Trading in copper has had but little life though prices remain as a week ago. We quote:

Lake copper, 15c to 16c; casting, 14½c; pig tin, 33c; spelter, 5c; pig lead, desilverized, 4.25c to 4.40c; in 50-ton lots; corroding, 4.75c to 4.90c in 50-ton lots; car lots, 2¼c per 100 pounds higher; sheet zinc, 7c list, f. o. b. LaSalle, in car lots of 600-pound casks; Cookson's antimony, 12½c to 13c; other grades, 12c to 12½c.

The situation in scrap metals is sympathetically dull. Fractional recessions in price obtain in most of the metals quoted and there is apparently no evidence of a prospective strengthening of the trade. We quote prices to dealers as follows:

Copper wire, 11c; heavy copper, 11c; light copper, 10c; heavy red brass, 10¼; heavy yellow brass, 8c; light brass, 5½c; No. 1 red brass borings, 9c; No. 1 yellow brass borings, 6.75c; brass clippings, 8c; tea lead, 3c; lead scrap, 3¼c; zinc scrap, 3c; zinc clipping, 3¼c; tin foil, 20c; tin pipe, 24c; pewter, 15c; electrotype plates, free from wood, 3¾c; electrotype dross, 2¼c; stereotype plate, 4¼c; stereotype dross, 3c; prime slab zinc dross, $62 per ton.

ST. LOUIS.

Dec. 9.

Lead and Zinc.—The operators of big mills in the sheet ground mines of Joplin are very much discouraged by the further decline in the price of lead and zinc in Joplin last week, and it is probable that the decline will dispel all talk of reopening mines that had closed down.

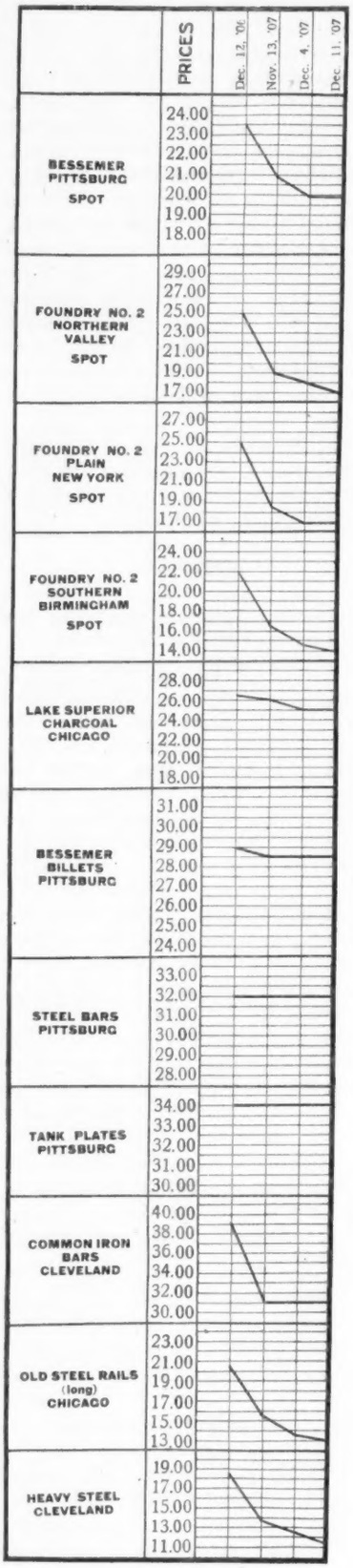
The American Zinc, Lead & Smelting Co., one of the heaviest producers in the Joplin district, and one that owns its own smelters, is said to be seriously considering the shutting down all five of its 500-ton mills at the end of the year, probably within the next two weeks.

As an offset to the closing of the big mills, old times are being revived among the abandoned shallow mines. Old hand-jigs are being brought into use again, windlasses and horse hoists are again coming into vogue, and the shallow workings are once more the life of the camps. This probably will be the means of preventing suffering in many homes this winter.

The highest price paid for zinc last week was $36 on an assay base running from $28 to $34 per ton of 60 per cent zinc. The highest price paid for lead was $42 per ton. Medium grades sold from $36 to $40.

Rockaway to Start.—The Rockaway Rolling Mill, Rockaway, N. J., which lost its plant by fire last February, has completed the work of rebuilding and will begin operations again Monday, Dec. 30, rolling bar iron, rounds, squares and flats. The new mill is thoroughly modern in every respect, with an annual capacity of 15,000 tons. Edward Ehlers is president.

PRICE CHART.



TARIFF QUESTION

Assuming Prominence in Canadian Legislation—Want Leeway Repealed.

(Special Correspondence.)

Toronto, Dec. 9.—With the re-opening of the Canadian parliament the tariff question is again assuming prominence. The Dominion Grange, a strong organization representing the farmers, which met in Toronto last week adopted a report on legislation, demanding that the protective principle be wholly eliminated from the tariff, and that it be reduced to a purely revenue basis. The legislation of last session, increasing and extending the bounties on iron and steel manufactures, was condemned as unjustifiable and a gross misappropriation of public funds. The executive board of the Canadian Manufacturers' Association in session at Ottawa, Dec. 5, passed a resolution asking the government to appoint a permanent tariff commission, with powers of adjusting the tariff analogous to the power now possessed by the railway commission in dealing with railway rates. This request will be urged upon the government at an early date. Should such a commission be appointed—which in the present state of public opinion is not at all likely—the manufacturers' association will appoint an expert to examine into complaints of inadequate protection and put the facts before the commission where a case for increased protection has been made out.

The alleged dumping of American manufactures on the Canadian market at prices below the cost of production in Canada and the price charged in the home market, was considered. The executive board decided to ask the government to repeal the clause of the act allowing a 7½ per cent leeway between prices charged in Canada and those in the country of export. As regards iron and steel products however it was agreed that the present 5 per cent leeway should be left unaltered.

MAY LIFT RECEIVERSHIP.

(Special Correspondence.)

Buffalo, N. Y., Dec. 9.—It seems likely that the receivership of the New York State Steel Co. will be lifted, or at least something definite announced toward that end, in a couple of weeks, according to Spencer Kellogg, its president and one of the receivers.

The rumor that it was to be combined with, or taken over by the Buffalo & Susquehanna Iron Co. is denied on all sides.

The Pullman company's repair shops here, which were burned last week, involving a loss of $500,000, insured, will, it is said, be rebuilt.

The Buffalo & Susquehanna Iron Co., which has one of its stacks out of blast for repairs, counts upon its being able to resume some time in January.

CARNEGIE VETERANS MEET.

Members of the Carnegie Veterans' Association to the number of 34 gathered at the Carnegie home, 2 East Ninety-first street, on the evening of Dec. 6 for the sixth annual dinner of the organization. The guests were received by Mr. and Mrs. Carnegie and the latter's sister, Miss Whitfield, after which the great banquet hall, which has witnessed so many happy occasions of this sort, was thrown open. As is customary, Mr. Carnegie presided. W. E. Corey, president of the United States Steel Corporation; James Gayley, first vice president; J. J. Campbell and J. H. Reed were among those who responded to informal toasts. W. B. Dickson, who has earned the title of poet laureate of the association, lived up to his established reputation in presenting a series of humorous verses, dealing with men and things as they appear to the second vice president of the steel corporation. A note of sorrow was sounded in an address of eulogy by a member on the life of H. J. Lindsey, the first member of the association to heed the call of death. Officers chosen during the evening were: Mr. Carnegie, president; Charles M. Schwab, vice president; and C. L. Taylor, secretary and treasurer.

Seated about the banquet table were the following: Andrew Carnegie, W. E. Corey, James Gayley, W. B. Dickson, J. H. Reed, C. W. Baker, W. R. Balsinger, W. W. Blackburn, H. P. Bope, L. T. Brown, J. J. Campbell, D. M. Clemson, A. C. Dinkey, R. A. Franks, A. R. Hunt, D. G. Kerr, F. H. Kindl, Thomas Lynch, E. S. Mills, A. Monell, Thomas Morrison, George E. McCague, W. C. M. Clausland, John McLeod, G. D. Packer, A. R. Peacock, L. C. Phipps, C. M. Schwab, James Scott, Emil Swenson, C. L. Taylor, H. E. Tener Jr., E. H. Utley, E. F. Wood.

Fire damaged the plant of the American Foundry & Mfg. Co., which covers a city block at Eleventh and Hebert streets, St. Louis, $15,000, Dec. 9. The loss is covered by insurance.

COKE PRODUCERS

Form Association for Betterment of Operating Conditions.

At a meeting at Uniontown, Pa., Friday night, attended by about 20 independent coke operators, an association to be known as the Coke Producers' Association was formally organized. Committees were appointed to invite all the independent operators in the upper and lower Connellsville regions to unite in membership with the association. The object of the new organization is statistical and for the enactment of suitable mining laws, which will better apply to the conditions under which operations are now being carried on in the district, than the present statutes. C. W. Kennedy, of the Orient Coke Co., is president.

AMERICAN STEEL FOUNDRIES QUARTERLY REPORT.

The statement of the earnings of the American Steel Foundries and its subsidiary companies for the quarter ending Oct. 31, 1907, is as follows:

Net earnings from operations after deducting manufacturing, selling and administrative expenses, and reserves for management commissions, and contingencies		$657,533.08
Interest, discount, etc		11,531.19
Total income		$669,064.27
Deduct:		
Interest on bonds	$58,075.00	
Sinking fund on bonds	26,250.00	
Depreciation	55,750.00	
		$140,075.00
Net income		$528,969.27

Wants Sale Annuled.—Legal action to set aside the sale of the interests of George I. Whitney in the Hostetter-Connellsville Coke Co. to the H. C. Frick Coke Co. and to declare the transaction void and illegal, has been filed in the United States circuit court at Pittsburg by James W. Shields, of Daytona, Fla. The plaintiff sets forth the allegation that the transfer has been made in restraint of trade in that the sale of the company's coke will be suppressed from the market except for the use of companies associated with the H. C. Frick company. Shields states that he is the holder of 100 shares of the stock of the company as collateral for loans made to George I. Whitney and that through the transfer, the value of this pledge will be depreciated.

Manhattan Bridge Bids.—The following were the bids submitted for the erection of the New York approach to the Manhattan bridge, requiring some 15,000 tons of steel: J. C. Rodgers, $2,167,304.50; Maryland Steel Co., $2,179,724; McClintock-Marshall Construction Co., $2,367,978; Williams Engineering Co., $2,410,682.

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PRICE COMPETITION AND THE FREEDOM OF TRADE.

Our lawmakers can obtain some very instructive lessons in business practices and the principles which underlie business in what is passing on in the iron and steel trade at present. In nearly all branches of the finished steel trade, there is an utter absence of price competition at a time when the amount of new business offered is but a small fraction of the previous normal, and when actual production is less than one-half the rate of two months ago.

There has been a deal of loose thinking on the subject of control or regulation of commerce by law. While the constitutional right of legislators to make laws on this subject is based on the fundamental principle that acts should not be committed which are in restraint of trade, the thought in the minds of legislators has been pretty clearly that of striving to prevent acts which would reduce or eliminate price competition. It cannot be shown that the elimination of competition is in restraint of trade, in its broad constitutional conception, since it is quite conceivable that capital would be invited to embark in an industry where there is not free price competition, and would be frightened from engaging in an industry in which free price competition prevailed, a point which will be referred to later.

Granting for the moment that the constitutional prerogative carries permission to legislate for the fostering of price competition, it must be admitted that legislation must be prohibitive and not constructive. It would be impossible to contemplate a law which should require manufacturers or transportation interests to compete with each other. If business interests cannot be commanded to compete, then they cannot be commanded not to refrain from competing, and the only prohibition could be that of definite acts the commission of which would be to restrain competition. If so, it is plainly desirable that legislators should familiarize themselves with all methods and acts whereby business interests might seek to reduce or eliminate competition. That they have not been thus familiar is the opinion of all business men who have expressed themselves on the subject.

A state of no price competition exists in the finished steel trade in the United States at the present moment. The trade accepts as one important cause of this situation the fact that there was a meeting of billet producers in Pittsburg on Oct. 30, and a dinner at the Waldorf-Astoria, New York, on Nov. 20, those who attended the latter being guests of Chairman Gary, of the United States Steel Corporation. The right of peaceable assembly and the right of freedom of speech are guaranteed by the constitution. In connection with these occurrences, there is no suspicion that those concerned did anything beyond exercising these two constitutional rights, there being no question that the assemblages were peaceable.

In this situation there is food for thought for legislators. If acts which are so broadly protected by the constitution can do so much for the forestalling of price competition the fact is suggestive that a very thorough study should be made of all influences which may have a tendency to restrain competition, before rational legislation can be hoped for.

No such half-baked opinion can be considered important in this connection as that of Mr. Bryan, elicited by THE IRON TRADE REVIEW'S correspondence in September, 1906, and since repeated frequently, that a "trust" should not be permitted to control more than 50 per cent of the production of any commodity. Often an irresponsible 10 per cent of the production has demoralized a market, and often the lead of an interest controlling much less than 50 per cent has been followed, to the prevention of price competition. Were there no better means of regulation than that of the 50 per cent dictum, there would be none at all.

Thought upon the regulation of commodity prices is tending in the direction that thought upon transportation prices has moved. As to the latter, pooling and rate agreements were declared illegal, and afterwards it was decreed that rates should be reasonable, whereupon the badness of pooling and rate agreements disappeared, and there is a prospect that they may be allowed again. Who can say, however, that a certain price for beams is a reasonable or an unreasonable one? If, however, legislation is to take any notice of iron and steel prices at all, that very thing must be done. The trade well knows that the matter of price competition or no price competition depends upon sentiment; if legislators do not know this, they must learn, and it may be just as well to recognize that in certain circumstances sentiment is more likely to uphold an unreasonable than a reasonable price.

Many years ago a wire nail agreement was made, under the leadership of "Cent-a-Keg Parks." Mr. Parks advised the establishment of a very high rather than a moderate price for

nails for the double reason that a very high price would hold up the menace of a greater loss, should cutting be inaugurated, and would deter the establishment of new competition by creating distrust as to the permanence of the arrangement, in the minds of would-be competitors. The outcome did much to prove the soundness of Mr. Parks' logic. The growth of tin plate making in the United States illustrated much the same principle. On the political reversal after the passage of the McKinley 2.2-cent duty, there was distrust as to its being continued, but when the 1.2-cent duty was established there was confidence that the worst had occurred, and tin plate enterprises were more freely embarked in.

A moderate price, held by a sensible understanding, may be in promotion of trade, as inviting the embarking of new capital, while an immodcrate one may frighten would-be investors, and thus tend to perpetuate itself in restraint of trade.

COMMERCIAL CORRESPONDENCE.

One cannot pass through his hands day after day the correspondence of a business house without awakening an interest in the character of the individual writers. The letter is just as truly indicative of the characteristics of the man behind it as are his speech, his manner, his looks or his dress.

Said an able business man the other day, "I never knew that I could write a good letter, or that there was anything out of the ordinary in my correspondence until I chanced to overhear a very complimentary remark regarding it." Whether he knew or not, his letters were typical of the man, full of individuality, clean-cut, with snap and go; they were, like his talk, energizing and vital.

All the rules in the world won't make an accomplished letter writer if he lacks the essential spirit in his own make-up. But both spirit and method can be trained and perfected. As evidence, note the distinctive character given to practically all of the correspondence from some specific concern. Every man becomes imbued, to a degree at least, with the spirit of the managing mind. The lack of education may be overlooked when we seek for and appreciate the spirit and not the letter.

Modern methods of publicity have developed to an abnormal degree the circular letter, with its numerous "follow-up" successors. Here is an attempt to accomplish almost the impossible, to make one letter suit the mind and moods of many men. Far easier may it be to address to a single individual an initiatory letter designed to open up new correspondence, and create interest in a new proposition. When you learn from the recipient of such a letter that it had "a ring to it that he liked," you may be sure that your entering wedge has been driven deep.

Put yourself in the other man's place, is a rule that may be well observed in all letter writing. Think—though it be almost sub-consciously—how such a letter would affect you. The broader your acquaintance with human nature, the more delicate your tact, the better will be your judgment.

If your letter must convey refusal, don't put it in the first sentence, and then devote the rest of the letter to explanations thereof. It's like knocking a man down, without warning, and then proceeding to explain to him why it was necessary. He might have been willing to lie down of his own accord if you had put the case clearly, and given him time to see the justice of it.

In these days of haste and dictation, of business hustle and system, the old time courtesy of even the business letter has practically vanished. We smile at the amount of time and space devoted by the Spaniard and his kind, to getting into and out of the body of his letter. But are we the better for asserting that "business is business?" Isn't it the personal touch which the salesman puts into his greeting and his farewell that make largely for his success? Why should we omit from the letter what we profess to be essential when the spoken takes the place of the written word? Isn't the business letter worthy of far more consideration than we are prone to give it? If so, it would certainly seem that more time, rather than less, should be devoted to each letter. It is not the saving in dictation that should be the measure of economy, but the resultant effect upon the recipient.

Is it possible to produce the best result with the machine-made letter? Has the ideal been reached when you have learned how to answer "sixty letters in thirty minutes" by means of an "Auto-Correspondent" outfit? Even though you are thus assured of a perfect "automatic correspondence system" that can be put into instant operation, and that "enables any firm, large or small, to turn its regular routine mail into a golden stream of business," are you really convinced that the old-time personal methods should be cast aside?

Truly the individual, the unit, has been almost lost to sight in these days of corporate combinations. But there is growing evidence of the finality of loss that is bound to result. The salesman still retains his individuality, and upon this largely depends his success; let the correspondent do likewise just so long as conditions will permit.

NEW EDITION OF "THE HON. PETER WHITE."

Orders may now be sent to the Penton Publishing Co. for the second edition of the book entitled "The Honorable Peter White." It is now on the press and will be out of the bindery in about ten days, in ample time to be delivered anywhere in the United States for the Christmas trade. The first edition of this work met with instantaneous success and the publisher resolved greatly to enlarge the scope of the second edition, embracing much new matter that had been discovered since the first edition was published and much that has also transpired since it was published. For instance, the new matter includes an account of the celebration at Sault Ste. Marie upon the completion of the first half century of the canal's usefulness.

The book of the second edition is nearly twice as big as the one of the first, containing among other things nearly one hundred extra pages of pictorial matter alone. The purpose of writing this book was to put in an imperishable form an authentic

history of the development of the great iron deposits of the Lake Superior country while it was yet possible to do so. The record has been obtained from the men that actually took part in the discovery and initial development of the iron mines. So vast indeed has been the progress of this industry, and so stupendous its results in the creation and distribution of individual wealth, that it seems incredible that it should have occurred within the lifetime of one man. Yet it is so. One man was there at the beginning and he is there yet—the Hon. Peter White of Marquette. He assisted in stripping the first iron mine developed in the Lake Superior country and it has seemed just to incorporate the story under his name, so universal have been his activities in this great industrial theater. The story as told is of uncommon interest to the iron world; in fact, the history of iron manufacture in the United States is not complete without it, since fully three-fourths of all the iron that is made in this country comes from the Lake Superior mines. Incidentally there is detailed the development not only of the mines but of the whole problem associated with the transportation of the ore. The growth of both docks and ships is faithfully followed. Good fortune has attended the publishers in procuring photographs of not only the earliest ships used in the transportation of ore, but also of the earliest docks and earliest types of unloading machines. It is therefore possible to follow the development of the unloading machine from the wooden tub to the automatic clamshell buckets capable of grabbing 12 tons of ore at a time.

In this work an endeavor has been made, not altogether without success, of relating the history of the iron trade from the human standpoint, investing, what might otherwise be a mass of statistical data, with the struggle of man against the obstacles of nature. Money is so plentiful nowadays that natural conditions offer no obstacles whatever. But the pioneers in the Lake Superior country were without means and their struggles were consequently severe. The price of the book is $2.00, postage 18 cents extra.

Julius A. Beiser, treasurer and manager of the Brackett Bridge Co., Cincinnati, has been authorized by the United States district court to dispose of the entire property at public sale Dec. 13.

UNIFORM COST SYSTEM

Reported Upon at Meeting of Philadelphia Foundrymen's Association.

The monthly meeting of the Philadelphia Foundrymen's Association, which was held at the Manufacturers' Club on the evening of Dec. 4, was largely devoted to an interesting address on "A Uniform Cost System for Jobbing Foundries" by James S. Stirling, manager of the foundry department of the Hilles & Jones Co, Wilmington, Del. Because of the importance of the subject, the superintendents and foundry foremen of the members were invited to attend, and the meeting was accordingly one of the largest held by the association in a long time.

Previous to the reading of the paper, the short weight committee, reporting on the complaints made by the New England Association, said that it had found foundrymen in eastern Pennsylvania pretty generally satisfied with the weights of coke and pig iron as billed to them by the railroads, and the committee was continued. It was decided to join the Atlantic Deeper Waterways Association, which aims to secure an inland waterway from Boston to Beaufort, N. C. The present officers, headed by President Thomas Devlin, were renominated for election at the January meeting, with the exception that James S. Stirling takes the place of W. C. Steele on the executive committee.

Mr. Stirling's paper, which is the result of two years' work by the cost committees of the Jobbing Founders' Association and the American Foundrymen's Association, excited considerable favorable comment, and the system was declared by him to be as feasible for small foundries as for large. It was illustrated by a number of lantern slides showing the cost sheets in use by the Hilles & Jones Co.

NEW YORK'S NEW BUILDING CODE.

Important changes in the building regulations of New York city have been recommended to the board of aldermen as the result of several months' work on the part of the thirty men making up the building code revision committee. W. A. Gramer, Room 11, City Hall, is secretary. The commission was composed of four representatives of the architectural interests of the city, four engineers, four builders, two mechanics, two plumbers, a legal expert and the chief of the fire department, in addition to the representatives of the five borough presidents and seven aldermen comprising the committee on buildings. The commission was thus thoroughly representative. Its work was chiefly carried on through subcommittees, of which there were 16. Among the most important of these were the following: Concrete construction as applied to walls, girders and columns, headed by Ulrich J. Huberty, a representative of the architects; steel and iron construction and strength of materials, headed by J. Clark McGuire, representing the engineers; and fireproofing, headed by Mr. McGuire.

AMERICAN CAR & FOUNDRY CO. EARNINGS.

The report of the earnings of the American Car & Foundry Co. for the quarter and the six months ending Oct. 31, 1907, compares with corresponding periods in 1906 as follows:

	1907.	1906.	Increase.
Net earnings..	$ 2,775,643	$ 1,779,982	$ 995,661
Pref. dividend.	525,000	525,000	.....
Balance ...	$ 2,250,643	$ 1,254,982	$ 995,661
Com. dividend	300,000	150,000	150,000
Surplus ...	$ 1,950,643	$ 1,104,982	$ 845,661
Prev. surplus..	21,320,608	15,245,148	6,075,460
Tot. surplus.	$23,271,251	$16,350,130	$6,921,121
May 1 to Oct. 31:			
Net earnings..	$ 5,368,621	$ 3,437,035	$1,931,586
Pref. dividend	1,050,000	1,050,000	.....
Balance ...	$ 4,318,621	$ 2,387,035	$1,931,586
Com. dividend.	600,000	150,000	450,000
Surplus	$ 3,718,621	$ 2,237,035	$1,481,586
Prev. surplus..	19,552,630	14,113,095	5,439,535
Tot. surplus.	$23,271,251	$16,350,130	$6,921,121

OPEN-HEARTH FURNACES OF PACIFIC COAST.

California now has two completed and two building open-hearth steel furnaces, as follows: Abner Doble Co., San Francisco; building two 5-gross-ton basic furnaces. Rudgear Steel Co., San Francisco (formerly the A. Merle Co.); one completed 15-gross-ton basic furnace. Pacific Jupiter Steel Co., San Francisco; one completed 10-gross-ton acid furnace. This company also makes crucible steel. In addition, the Great Western Rolling Mills Co., at Rodeo, Cal., may erect open-hearth furnaces later on.

In the state of Washington, the Cascade Steel Foundry, of Seattle, is building one 10-gross-ton basic furnace at Earlington, 10 miles from Seattle.

In Oregon, the Columbia Steel Co. is talking of building one 10-gross-ton open-hearth furnace at Linnton, near Portland.

BEST REPORT

In Its History Made by Harbison-Walker Refractories Co.

The fifth annual statement of the Harbison-Walker Refractories Co., Pittsburg, covering the year ended Sept. 30 and just submitted to the stockholders, was the best made by the corporation in its history.

The income account of the company, as it compares with other years, is as follows:

	1907.	1906.	1905.	1904.
Net profits	$1,962,168	$1,739,082	$1,169,990	$1,068,057
Sundry deductions	217,431	239,689	88,962	118,663
Balance	$1,644,737	$1,499,393	$1,081,028	$ 949,394
Interest	136,687	145,438	154,812	163,563
Surplus	$1,508,050	$1,353,955	$ 926,216	$ 785,831
Preferred dividends	576,000	576,000	576,000	576,000
Surplus	$ 932,050	$ 777,955	$ 350,216	$ 208,831

The surplus accumulated during the five years of the company's existence has amounted to $2,858,000, invested as follows: Betterments, $1,150,000; bonds redeemed to cover sinking fund requirements, $885,000; bonds of the company bought and held in treasury, $432,000; increase in accounts receivable, $151,000; increase in cash, $240,000. Expenditures for betterments cover the following new fireproof plants: Mt. Union No. 2, Hays station No. 4, brick plant at Templeton, and in addition the silica brick plant, just completed, at East Chicago. The betterments also cover extensive enlargements of old works and large additions to mineral holdings. In addition $387,000 has been expended during the past five years in extraordinary repairs. The balance sheet, as of Sept. 30, shows total assets of $33,772,486. The annual meeting of the shareholders will be held Jan. 20.

IRON SHEET AND PLATE EXPORTS INCREASE.

The foreign market for iron sheets and plates of American manufacture is growing at a rapid rate. The exports for October last amounted to 3,566 gross tons, corresponding to 2,758 gross tons in the same month of 1905. For the 10 calendar months ending October, 1907, the total exports were 31,626 gross tons, against 13,263 gross tons the same period in 1906, and 6,420 gross tons in 1905. Steel sheets and plates are not displaying so good a record, the October exports of 6,549 gross tons showing a considerable loss against 8,925 gross tons in 1906. For the 10 months ending October, 1907, the exports were 70,488 tons, against 77,408 gross tons in 1906, and 53,539 gross tons in 1905.

Steel Rail Exports.—Shipments of American steel rails to foreign countries show a slow but steady growth. The exports of October this year were 34,753 tons, against 22,732 tons in October, 1906. The total of the 10 months ending October, 1907, was 288,002 tons, against 273,010 tons in 1906, and 249,941 tons in 1905.

Iron Ore Imports.—The imports of iron ore in October were 83,361 tons dutiable, compared to 90,336 tons dutiable in 1906. For the 10 months ending October, the total ore imports were 1,055,701 tons dutiable, against 908,366 tons dutiable in 1906, and 709,766 tons dutiable in 1905.

Pig Iron Imports.—A decided decline in pig iron imports was shown in October, when the total was 9,893 tons dutiable, against 35,789 tons dutiable in October, 1906. The 10 months' total for the present year is 459,040 tons dutiable, against 265,665 tons dutiable in 1906, and 170,891 tons dutiable in 1905.

Crude Steel Imports.—In October, 1,579 gross tons of crude steel of foreign make were received in this country. This compares with 2,091 gross tons in October, 1905. Ending October, 1907, the 10 months of the present year show imports of 13,043 gross tons, compared to 17,067 gross tons in 1906, and 11,500 gross tons in 1905.

Cleveland Foundrymen Meet.—A partial report from the committee on costs was one of the leading features of the annual meeting of the Cleveland Foundrymen's Association held Dec. 3. The complete report of the committee will be presented later and definite action on a uniform cost system for foundries is then expected to be taken. Preliminary preparations were made at the meeting for the holding of a banquet and social assemblage of the Cleveland foundrymen early in the new year. In the election of officers, W. C. Bruce, of the Bowler Foundry Co., was named as president; E. O. Saeltzer, of the Loew Mfg. Co., vice president, and C. J. Snow, of the Macbeth Iron Co., treasurer. The officers with W. D. Sayle, of the Cleveland Punch & Shear Works Co., and W. W. Balkwill, of the Cleveland Steel Casting Co., constitute the executive board.

HAPPY SPEECH

Made by Andrew Carnegie at Banquet at Engineers' Club.

Andrew Carnegie, Thomas A. Edison and Mark Twain were among the speakers at the inaugural banquet held on the evening of Dec. 10 by the Engineers' Club at its new home at 32 West Fortieth street. T. C. Martin, president of the club, acted as toastmaster and other speakers were John Fritz, of Bethlehem, Pa.; William H. Fletcher and John Foord. Mr. Carnegie, whose generous gift made possible the magnificent clubhouse, was in a patricularly happy mood and his speech sparkled with humor and kindliness. He congratulated the club on its new home and referred to the importance of the engineers meeting socially as well as professionally. He continued:

This is the age of the engineer. Never before in the history of the world has he been so important. Perhaps some of you have read Kipling's latest production, "The Sons of Mary and Martha." Upon the latter there has been thrown the work and cares of the world; theirs to transform conditions, to invent, plan and execute and bring to man all the improvements that have delighted and astonished us in this generation, and the last, beyond all others that have preceded. We telegraph without wires, and neither under nor upon the ocean, but through the air, annihilating space. We fly with the speed of birds of the air by a spark of gasolene. We speak to each other through the telephone and listen to the finest music in our homes from the imprisoned voices of the greatest singers. Mysterious powers hover round us subject to our call. All this would have seemed miraculous to our grandfathers.

The engineers are the true sons of the more useful sister and are indispensable. They have played a great part in this transformation. The sons of Mary may be all well enough in their place, although I confess myself at a loss just exactly to find a place for them that redounds much to their credit in this everyday world. We can see little use for them and cannot help the thought arising at the moment that it may be very much with them as Josh Billings said about mosquitoes; doubtless the Lord made all things well and there was some reason for making mosquitoes, but he wished it had been so arranged in their case that they would only bite those that could see it. One feels something of the same thing when he views the gay, sporting, frivolous lives of the sons of Mary.

The Union Machine & Foundry Co., Muskegoo, Okla., is planning the erection of a plant at that place. As the consolidation of another plant is now being considered, definite information as to buildings is not available.

DEATH OF JAMES B. WILKES.

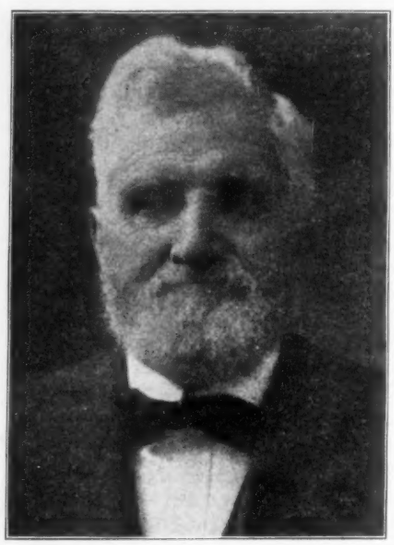
James B. Wilkes, late president of the Wilkes Rolling Mill Co., Sharon, Pa., whose death, Oct. 8, was briefly mentioned in a recent issue of THE IRON TRADE REVIEW, had spent a long and prominent career in the iron industry of the country. He was born of English ancestry in Tredegar, Monmouthshire, England, Dec. 8, 1833. He was a sturdy child and began work when about seven years of age, in turning a wheel in one of the works in Tredegar, one of the great iron towns of England. He grew to manhood in his native town, and gradually mastered the intricacies of the iron industry, through his indomitable courage and great perseverance.

In the spring of 1861, Mr. Wilkes came to this country and located in Scranton, later going to Pittston, Pa., and Duncansville. After serving in the Union army, he went from Duncansville, to Pittsburg, and in 1862 was with the Graff-Bennett Co., of Allegheny.

Finally Mr. Wilkes came to Sharon, and began his connection with Coleman, Westerman & Co., afterward known as the Westerman Iron Co., and still later known as the Sharon Iron Co., In 1865-66 he together with a company of other men, planned and erected an iron mill at Canal Dover, and, while one of the stockholders, he did not take an active part in the operation of this plant. He continued his interest in this works until 1874. In the meantime he continued his connection with the Sharon Iron Co., in which capacity he continued until 1876, when he was sent west to manage the property interest of that company. In Evansville, Ind., he managed the Evansville Rolling Mill. Later, when James Westerman purchased the Lockport, N. Y., mill, Mr. Wilkes went to the latter place, and was with that company up to the time of the death of Mr. Westerman.

During these years Mr. Wilkes had been pursuing his study of industries and manufacturing in its various details; he had also been planning to erect and operate a plant of his own. Accordingly, in 1891, the foundations of the Wilkes Rolling Mill in Sharon, were laid, and the following year the works were put in operation. Mr. Wilkes, together with his sons, and sons-in-law, have continued to operate and improve the plant since its erection. In 1901 a sheet department was added to the works, and later an electric plant and corrugating department were also built. Mr. Wilkes was president and general manager of the company. This works prospered under his careful supervision, and the company is now recognized as a strong independent concern.

Mr. Wilkes was a man of optimistic temperament, always happy and congenial, loved and respected by all who knew him. In his death his family has lost a loving and indulgent father, and the community one of its best citizens. He had seen Sharon grow from a small village to its present size. He began at the bottom of the industrial ladder, and by his perseverance and indomitable courage, built up a large and profitable business. Mr. Wilkes was a man of charming personality and keen judgment, and was possessed of a most remarkable memory. In politics he was a Republican He was a member of the Episcopal Church, and for many years devoted himself to Sunday school work. A lover of literature and of nature, and a close student of history and government, he made friends of all with whom he came in contact. A widow and seven children survive.



JAMES B. WILKES.

Frederick F. Zehm, founder of the firm of the Kutztown Foundry & Machine Co., Kutztown, Pa., died suddenly Dec. 1 of apoplexy, aged 71 years.

Stiles C. Smith, a veteran business man of Cleveland, died at his home in that city Dec. 4 at the age of 76. Mr. Smith was a native of Connecticut and early established himself in business in Cleveland. He was a director of the Cleveland Malleable Iron Co., the National Malleable Castings Co., the Eberhard Mfg. Co. and other enterprises. He was prominently identified with church and charitable work.

Robert Angst, chief engineer of the Duluth & Iron Range railroad, died at Duluth, Nov. 30, at the age of 60. Mr. Angst was one of the leading authorities of his time on ore dock construction. He was a native of Switzerland.

PERSONALS.

John Tyler, for the past six years manager and superintendent of the American Brass Co., Kenosha, Wis., has severed his connection with that company.

Daniel F. Morgan, chemist for the Jackson Steel & Iron Co., Jackson, O., was elected secretary and treasurer of the Crucible Club at its last meeting at Ironton, O.

Frank K. Highberger has resigned his position with the Carnegie Steel Co., Pittsburg, to become manager of sales of the New York State Steel Co., Buffalo, N. Y.

E. Ronceray, of Ph. Bonvillain and E. Ronceray, who has been in this country for several months in the interests of their "Universal System" of molding machine, sails for France Dec. 12.

Frederick W. Smith, vice president and general manager of the United States Radiator Co., Dunkirk, N. Y., has severed his connections with that company after a service extending over about seven years.

W. B. Dickson, vice president of the United States Steel Corporation, has been elected a director of the Red Metal Co., succeeding I. D. Frazer. The remaining retiring directors were re-elected.

R. O. Jones has assumed the duties of chief engineer of the Dayton Hydraulic Machinery Co., Dayton, O. Mr. Jones is an engineer of wide experience in the manufacture and construction of pumps of all kinds, having been for the past nine years associated with the Jeanesville Iron Works, Hazelton, Pa., in the capacity of chief engineer.

S. Owen Livingston, who has for several years been with the Fox Machine Co., in charge of the advertising and the foreign sales departments, has severed his connection with it to become interested in the Wilmarth & Morman Co., Grand Rapids, Mich., manufacturer of drill grinders, etc. Mr. Livingston will take active charge of the sales and advertising for the Wilmarth & Morman Co.

George H. Marting, who has charge of the stone quarries and coal mines of the Columbus Iron & Steel Co., Columbus, O., and Alex. N. Flora, who has been secretary of the company, have resigned to accept the presidency and secretaryship respectively of the Monarch Specialty Mfg. Co. The new company will make a specialty of brass goods such as water motors, water lifts, air pumps, etc.

THE CONVERTER VS. THE SMALL OPEN HEARTH-II

BY W. M. CARR

The production of light sections exclusively in an open-hearth shop equipped with large furnaces has not proven entirely satisfactory because the casting of numerous small molds entails a prolonged pouring period during which the ladle of steel becomes sluggish resulting in skulls and defective castings.

It is a fact that normal open-hearth metal is fluid enough for all practical purposes, and allows the pouring of all light work from the first part of a heavy heat (10 tons or more). It is obvious that losses from skulls and miss-run castings can be avoided by reducing the size of the heats and thus shorten the pouring period. In other words, casting less metal into fewer molds, is a logical step in open-hearth practice in its adaptation to the production of light parts and tonnages, consequently a 5-ton open-hearth furnace (acid or basic) delivering metal of the same normal casting temperature as larger furnaces, will turn out more effective work, for the purpose under consideration, by virtue of the shortened pouring period.

Advantages of the Converter.

The advantages of the 2-ton converter are as follows:

(1) It can be cheaply installed. (Approximate costs later.)

(2) It can be started up on short notice and operated at irregular intervals.

(3) It is well adapted for light sections, (a) when strength is important or, (b) when strength can be neglected.

(4) It produces steel of such a high temperature that it can be transferred to hand ladles with but moderate skill, and permits lip casting of molds, a feature that favors lessening the size of gates and a better quality of product because the size of the stream of metal is under good control.

(5) Its product is of good quality, bearing inspection in chemical and physical tests with that of open-hearth or crucible steel of like composition.

Disadvantages.

The disadvantages can be summed up as follows:

(1) No objection can be cited against advantage (1).

(2) The claim of the possibility of irregular operation proves to be costly. An organization must be maintained during intervals of idleness. If but one heat per day is considered as a minimum its burden of operating expense will be as heavy as two heats every other day. In any event the converter must be preheated internally by coke or oil preparatory to blowing. Coke will burn to ash, more or less, which acts as a non-conductor so that the bottom of the converter will be cooler than its sides. An oil flame, however, will give a more uniform heat. But a preheating does not always heat the converter fully before it can receive a molten charge of pig iron with the result that a single heat may be too cool and cause losses through skulls, etc. The necessary preheating of the converter adds to the cost of production through the consumption of extra fuel. The economy in small irregular outputs is doubtful, on such a basis, and the owner of a converter would be safer financially to fill his orders through outside sources.

Continuous Operation.

Continuous operation is the keynote in any steel casting method, the greatest possible quantity in the briefest possible time and as frequently as possible. Irregular, intermittent work must yield uncertain profits, carry heavier charges for labor and superintendence, etc., than steady regular production, aside from any consideration of prices of material or initial outlay for an installation.

Continuous operation will be defeated with but one converter. It must be taken off for repairs every 20 or more heats occupying several days in relining, drying and warming. For continuous production it is recommended that three 2-ton converters be erected. The practice would then be, one active, one in course of repair and one warming up. The cost of such an installation while less than an average open-hearth furnace, will be about the same as a small open-hearth.

(3) Its adaptability to light sections is purely one of cost and its value will be competitive with crucible steel (a), and malleable (b), but the force of the advantage will be weakened or supported by conditions in the preceding section.

(4) The high initial temperature of the steel from the converter, brings into play the personal equation in a pronounced manner. The judgment of the proper casting condition rests with the foreman or blower. The practiced eye is the sole guide. The point is one which must be closely watched. If his judgment is at fault from any cause and the metal is poured at too high a temperature, there will be heavy losses through "hot-cracks." It is recognized that such a weakness is common to the side-blown converter and is a more prolific source of loss in defective castings than any other method of production. The proper casting temperature being subject to eye measurement is a greater variable than open-hearth temperatures, and, therefore, is a drawback.

(5) In regard to quality, the ultimate of a desired finished composition is not entirely dependable. The analysis of a given heat may be uniform throughout but in comparison with other heats where uniformity of product may be sought regularly there will be variations. The content of carbon, silicon and manganese in the final analysis varies with the quantities of the usual deoxidizers used and the composition of the charge of metal at the end of the blowing operation, and, unless the weight of steel produced is known with a fair degree of accuracy and its composition at that stage, there will always be an element of guess work as to dosing to reach a certain analysis.

Final Composition.

The final composition at the end of the conversion operation depends entirely upon the personal equation and the conditions under which the blow may be conducted. The position of the tuyeres, the angle of the converter while blowing, the proper blast regulation at different stages are details demanding due observance since slight variations in their various manipulations will be greatly reflected in the quality and quantity of output.

One of the common drawbacks in converter manipulation is encountered in what is known as "sloppy-blows," a violent spitting and throwing out of the mouth of the vessel large quantities of metal and slag. This particular feature is largely responsible for the heavy losses in the operation of conversion.

The operation of the converting process does not permit a stoppage at any stage to take samples for chemical tests. A decided disadvantage in comparison with open-hearth practice wherein tests can be taken at any stage and through their results make any needed change by different additions. The converter lacks that flexibility.

The heavy losses, previously mentioned, do not take into account losses in defective castings, gates, skulls, risers or fins, but refer only to the differences between metal charged and that yielded in readiness to pour into molds. First there will be a cupola loss of between 5 and 6 per cent and an additional loss in blowing in the converter which may vary between 10 and 25 per cent, so that there will be a total loss of anywhere from 16 to 30 per cent. The economy of the converter process must depend upon such losses. They are too vital to be regarded lightly.

FIG. 1—CHARGING SIDE OF OPEN-HEARTH FURNACES, SHOWING CHARGING MACHINE, FOLLANSBEE BROS. CO.

FIG. 2—POURING SIDE OF OPEN-HEARTH FURNACES, SHOWING PIT AND LADLE CRANE, FOLLANSBEE BROS. CO.

THE NEW CONSTRUCTION OF THE FOLLANSBEE BROS. CO., AT FOLLANSBEE, W. VA.

For a number of years, the Follansbee Bros. Co., of Pittsburg, has operated at Follansbee, W. Va., an extensive sheet and tin plate mill, with a specialty of high grade sheet and tin plate, terne plate and sheets for stamping. The equipment comprised six tin and two sheet mills, seven cold rolls and 10 stacks in the tin house. Up to last December, the company purchased all its raw material.

Last year a decision was arrived at to put up an open-hearth plant and bar mill, in order that the sheet bars necessary could be made on the premises. The plant was erected by the Follansbee Bros. Co., and was placed in operation in December, 1906. The new construction adjoins the old building on the south and comprises a main building 50 x 400 feet with an L on the west end 50 x 100 feet. The buildings are all of structural steel construction with corrugated iron sheathing and a peaked roof.

In the L are situated two open-hearth furnaces, which were originally of 25 tons capacity. One of them has, however, been rebuilt to 35 tons and the second is to be rebuilt to a similar capacity as soon as repairs on it are needed. These furnaces are served by an Alliance Machine Co., 2½-ton crane-type charging machine. The illustration, Fig. 1, shows the charging side of the furnaces with the charging machine in position. The fuel used in the furnaces is gas supplied by the local gas company. The Follansbee Bros. Co., however, has started gas wells on the hill back of the works, and in the near future its own natural gas will be used as fuel. Velte valves are used on the furnaces and the waste gases are discharged through two self-supporting steel stacks 4 feet diameter by 125 feet high.

The scrap and storage yard is situated to the east and south of the main building, and is traversed by a system of narrow gage tracks. The charging boxes are filled in the yard and brought into the open-hearth building on flat cars running on a narrow gage track running in front of the furnaces.

The pouring side of the furnaces is shown in the illustration, Fig. 2. As the hearth of the furnaces is but little above ground level, and as the building floor on the charging and pouring side is at the same elevation, it has been necessary to excavate a pit for the ladle and also for the ingot molds. This pit is clearly shown in the illustration of the pouring side of the furnaces. It extends out a distance of about 15 feet from the back of each furnace, these two legs being connected by a cross pit for the ingot molds. A small jib crane serves each pit in addition to the two 40-ton ladle cranes, which span the entire main building. These cranes have a 10-ton auxiliary hoist and are of 50 feet span.

The reheating furnaces for the ingots are situated along the east wall of the building and to the north of the open-hearth furnaces. These furnaces are two in number and have four doors each. They are supplied with gas by the local gas company and discharged to a self-supporting steel stack 4 feet diameter by 125 feet high. These furnaces are served by a floor type charging machine clearly shown

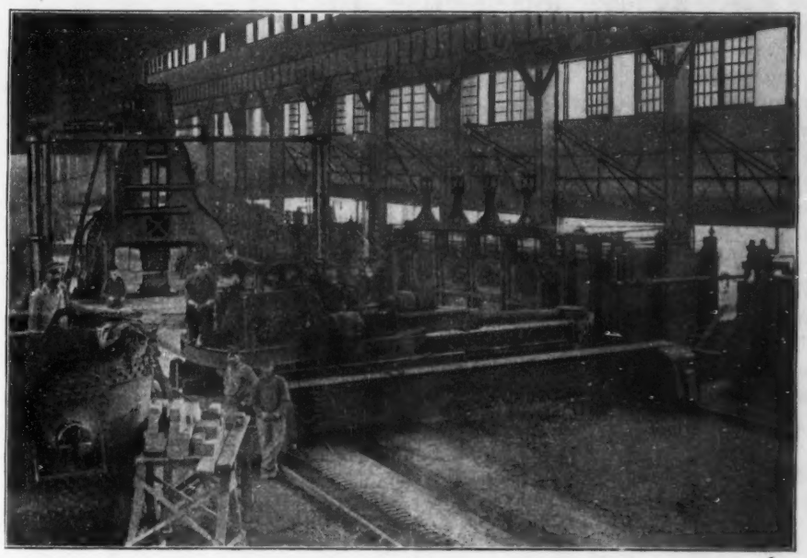


FIG. 3—REHEATING FURNACES, CHARGING MACHINE AND STEAM HAMMER.

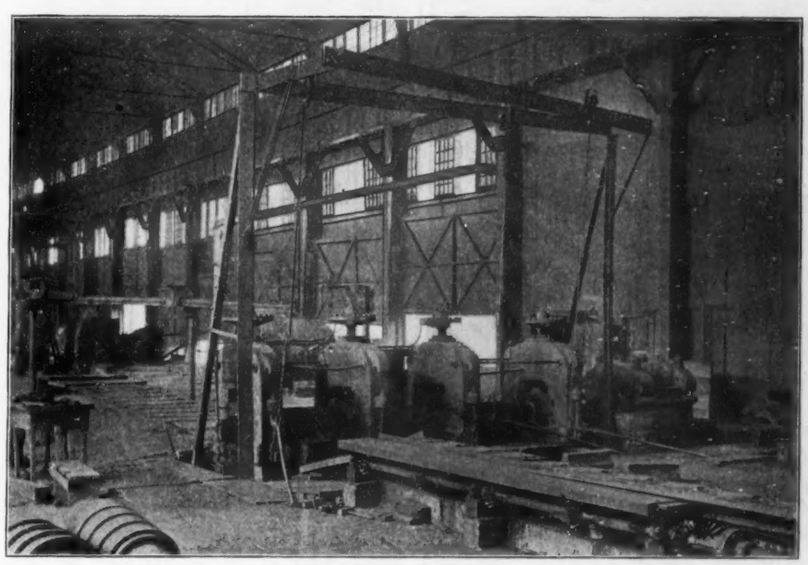


FIG. 4—THE BAR MILL.

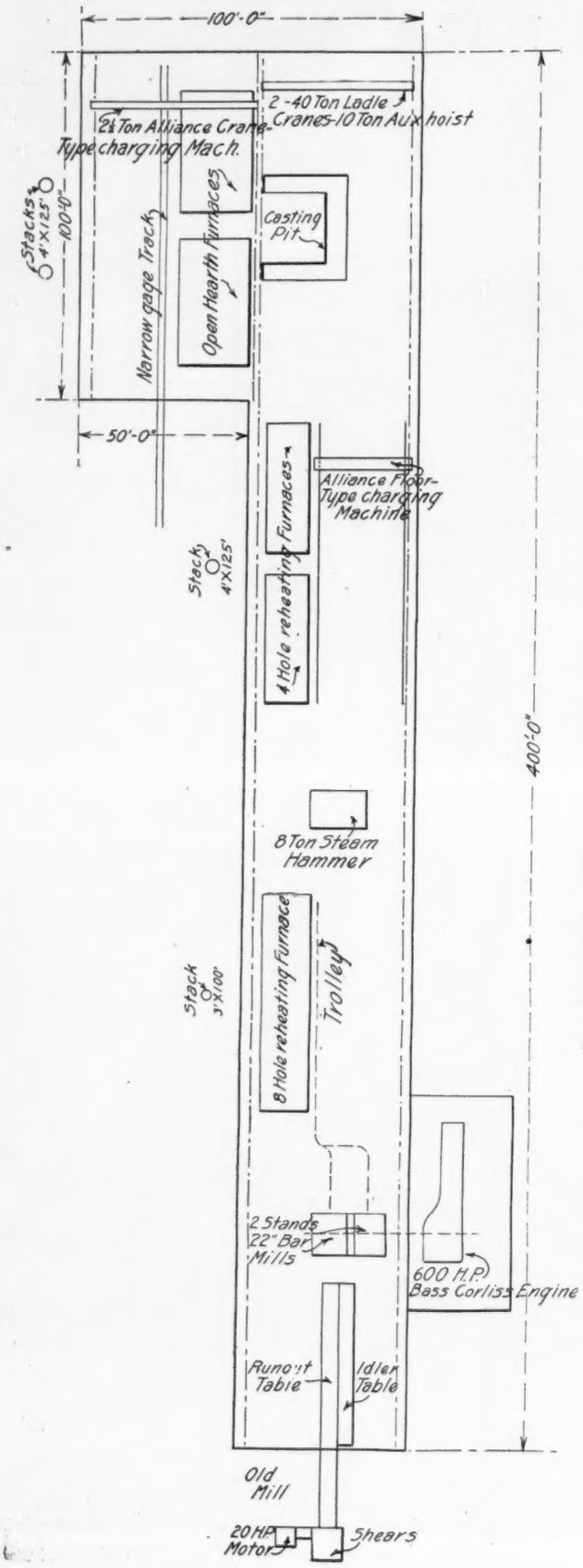


FIG. 5—PLAN OF EXTENSIONS TO PLANT OF FOLLANSBEE BROS. CO.

in the illustration, Fig. 3. This machine was built by the Alliance Machine Co., Alliance, O. Power is supplied to it by an underground trolley, the wires being led in a pit immediately inside of one of the rails. This feature is clearly shown in the illustration.

A noteworthy feature of the working of the ingots of this company is that they are forged to billets under a steam hammer instead of being rolled. The 8-ton steam hammer used can be seen in the illustration, Fig. 3, immediately beyond the reheating furnaces. The forged billets pass from this hammer to an 8-door reheating furnace, where they are brought up to the proper temperature for rolling to sheet bars. These furnaces are equipped with Velte valves, as are all furnaces in the plant and discharge to a stack 3 feet diameter by 100 feet high.

The bar mill comprises two stands of 22-inch two-high mills. Overhead trolleys are used to convey the hot billets from the last reheating furnace to the stand. The first or roughing stand situated alongside the finishing stand has five passes, while the finishing stand has four. The tables of the roughing stand consist simply of apron plates laid in the ground at the level of the rolls. The table on the entering side of the finishing stand consists of apron plates laid on an incline, as can be seen in the illustration, Fig. 4. On the delivery side of the finishing stand are two tables side by side, one an idler table and the other a run-out table leading to a shear in the old building. The idler table extends only a portion of the length of the run-out table and is used simply for convenience in handling the longer pieces of sheet bar. The run-out table is motor-driven and conveys the finished bar to the shear, which is driven by a 20-horsepower motor, where they are cut into sheet bars of the proper length and sent through the regular process of finishing into sheets and plates.

The bar mills are driven by means of a 600-horsepower Bass Corliss engine situated in a lean-to on the north side of the new building.

Three new coal and coke companies were incorporated under the laws of West Virginia recently as follows: The Henrietta Coal & Coke Co., Welch, W. Va., capital $25,000; the Pittsburg Standard Coal & Coke Co., Kings Creek, W. Va., capital $3,000,000; the W. P. Rend Coal & Coke Co., Chicago, capital $1,500,000. All will establish coke ovens.

FOUNDRY BLOWER PRACTICE[1]

BY WALTER B. SNOW

Modern foundry practice in the melting of metals is fundamentally dependent upon the blower. As the successor of the blow pipe and the bellows, it has made possible the massing of fuel in large quantities, with greater imposed resistance, the production of higher temperatures, and the better utilization of the heat in the furnace.

The primary function of a blower is to move air against resistance. Its performance is dependent upon the relation expressed by the formula:

$$V = \sqrt{2gh} \qquad [1]$$

in which V = velocity in feet per second
h = head in feet
g = acceleration due to gravity = 32.16

or $$V = \sqrt{2g\frac{p}{d}} \qquad [2]$$

when h is expressed in terms of p = pressure and d = density.

When applied under the conditions of
p = pressure in ounces per square inch
d = density or weight per cubic foot of dry air at 50 degrees Fahr. and under atmospheric pressure of 14.69 pounds or 235 ounces = 0.077884 pound, formula [2] becomes

$$V = \sqrt{64.32 \times \frac{p \times 144}{16 \times 0.077884 \times \frac{235+p}{235}}} \qquad [3]$$

which reduces to

$$V = \sqrt{\frac{1746659 \times p}{234+p}} \qquad [4]$$

Allowance is evidently made therein for compression of air but not for change of temperature during discharge.

The velocities in the basis Table I were calculated by this formula.

The tabulated volume is in each case the produce of velocity and effective area.

The theoretical horsepower is the product of pressure, velocity and effective area.

For refined work, or under conditions of wide variation from the basis of the table, corrections should be made for differences in humidity and temperature.

In the ordinary processes of the foundry, where iron or the less refractory metals are to be reduced, the resistance of the crucible, air, or cupola furnace will roughly range from somewhat above one ounce to a possible but usually unnecessary pressure in excess of 20 ounces per square inch.

Up to about 8 ounces the fan blower cannot be excelled for convenience and efficiency. From 8 to 16 ounces the field is fairly divided between the fan and the rotary types, the advantage gradually shifting from the former to the latter as the pressure increases. Above 16 ounces the superiority of the rotary type is manifest until it in turn encroaches upon the efficient field of the blowing engine at about 5 pounds; a pressure far in excess of the practical requirements of the foundry. The air compressor, as an aid to combustion, is economically useful only in connection with the burning of liquid fuel.

Fan and Rotary Blowers.

The fundamental differences between the fan and the rotary type of blower lie in the manner of creating pressure and in the effect of resistance.

In the fan type, velocity is given to the air in its passage from the inlet to the circumference of the revolving wheel. This is transformable into pressure with corresponding density within the enclosing case and connections; the pressure being dependent upon the number of revolutions. In the case of a fan blower at constant speed, the volume and power decrease as the resistance increases. When the outlet is closed, the wheel continues to revolve at the same speed, but without effective delivery, and with minimum power expenditure.

In the rotary, or so called "positive" type, air in regularly succeeding volumes is imprisoned by one or more enclosed revolving impellers, and forced forward against the imposed resistance. It is thereby compressed to a density, and given a pressure proportionate to that resistance. This pressure is fundamentally independent of the number of revolutions. The delivery remains practically constant for a given speed as long as discharge is permitted, while the power expenditure increases with the resistance. When the outlet is closed, the power required is at the maximum, and the displacement, though ineffective, is just equal to the slip; up to the limit of power to drive and of strength to endure.

Design of Fan Blower.

The construction and proportions of a prevalent type of cupola fan blower are illustrated in Fig. 1. The casing and wheel are provided with two inlets, which, in ordinary construction, are about one-half the diameter of the wheel. The width of such a wheel at its periphery ranges from 5 to 8 per cent of the diameter, the width between the side plates at the inlet being approximately one-sixth of the diameter. From six to eight major blades extend from inlet to circumference; between these are one, two or three times as many minor blades of about one-half the radial length. All blades are slightly curved backwards at the circumference of the wheel. The cast iron casing is of involute form, its greatest diameter being approximately 1¾ times the diameter of the enclosed wheel.

In the volume type, designed for much lower pressures, such as are required in air furnace operation, the peripheral width of the wheel ranges from 20 to 40 per cent of its diameter. The casing is often of steel plate.

Refined consideration of blower design is not necessary in a discussion of foundry blower practice, but a knowledge of fundamental principles and empirical relations is essential to a clear understanding of the subject.

The manufacturers' rating of the type of blower shown in Fig. 1 is based upon the greatest effective area over which it will maintain the maximum velocity of discharge. As originally established by Sturtevant, this "capacity area" or "square inches of blast" is represented by the empirical formula

$$\text{Capacity area} = \frac{DW}{3} \qquad [5]$$

in which D = diameter of wheel in inches
W = width of wheel at circumference in inches.

This formula was derived from the pressure type of fan blower. The value of the divisor must necessarily vary with the proportions of the wheel, the number of inlets, the number and curvature of the blades, and the form of the enclosing case. But as a merely arbitrary basis, the formula has been generally accepted for the ready comparison of wheels of substantially the same type.

Manifestly the maximum velocity of discharge will create the maximum total pressure. As a factor in the manufacturers' rating this attainable

[1] A paper read at the New York (Dec., 1907) meeting of the American Society of Mechanical Engineers.

velocity has been accepted as being equal to the circumferential speed of the wheel. This assumption is by no means universally correct.

Recent Developments in Fan Construction.

Recent developments in fan construction with very large inlets, numerous shallow blades, and unusual width, show discharge velocities far in excess of the circumferential speed, approximating a theoretical maximum of twice that speed. But successful application of such fans has not yet been made under the resistance obtaining in cupola practice.

It is evident that, disregarding the effect of changes in density and temperature, the following relations should hold for a given fan with constant capacity area:

a the volume varies directly as the revolutions,
b the pressure varies directly as the square of the revolutions,
c the power varies directly as the cube of the revolutions.

These relations clearly point to the economic desirability of closely proportioning the fan to the work it is to perform. An increase of only 25 per cent in the speed, which may be necessitated by deficiency in the volumetric capacity of a given fan, nearly doubles the power required, and creates a pressure more than 50 per cent in excess of that at normal speed. It is seldom that the sum of fixed charges and operating expense cannot be materially reduced by substituting a larger and more costly fan for one that must be run at unnecessary speed to deliver the required volume.

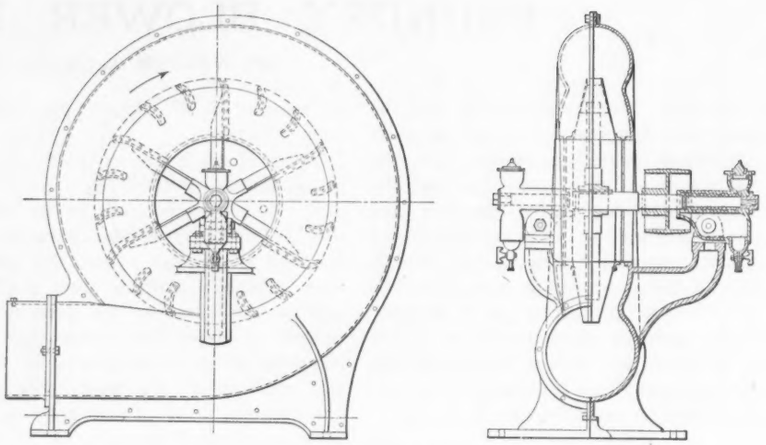


FIG. 1—FAN BLOWER

Table I.

RELATIONS OF PRESSURE, VELOCITY, VOLUME AND HORSEPOWER.

Pressure Per Sq. In. Ozs.	Velocity of Dry Air at 50 Degrees Fahr. Escaping Into Outer System Through Any Shaped Orifice.		Volume Discharged in One Minute Through an Orifice Having Effective Area of One Sq. In. Cu. Ft.	Horsepower Required to Move Given Volume Under Given Conditions.
	Feet per Sec.	Feet per min.		
1	86.03	5,161.7	35.85	0.00978
2	121.41	7,284.4	50.59	0.02759
3	148.38	8,902.8	61.83	0.05058
4	170.98	10,258.6	71.24	0.07771
5	190.76	11,445.5	79.48	0.1084
6	208.53	12,511.9	86.89	0.1422
7	224.77	13,486.4	93.66	0.1788
8	239.80	14,387.9	99.92	0.2180
9	253.83	15,229.6	105.76	0.2596
10	267.00	16,020.4	111.25	0.3034
11	279.70	16,768.1	116.45	0.3493
12	291.30	17,478.2	121.38	0.3972
13	302.59	18,155.2	126.06	0.4470
14	313.38	18,802.7	130.57	0.4986
15	323.73	19,423.6	134.89	0.5518
16	333.68	20,020.7	139.03	0.6067
17	343.26	20,595.8	143.03	0.6631
18	352.52	21,151.0	146.88	0.7211
19	361.46	21,687.8	150.61	0.7804
20	370.13	22,207.5	154.22	0.8412

Speed.

The speed of a fan is usually fixed, and variations occur only in the effective area of discharge. In cupola practice such variation is extensive, and changes often succeed each other with frequency. Hence it is difficult to proportion the fan to secure the most economical average performance.

For the ordinary type of fan it has been generally accepted that within the capacity area

a The velocity and pressure are maximum and constant.
b The volume and horsepower are proportional to the area.

These relations are only approximate, as is evident from Fig. 2. The curves are characteristic of an individual instance in which the fan ran at constant speed while discharging through various outlet areas. All values are relative to the performance at capacity area. Changes in the proportion or the speed of the fan would materially affect these relations, causing them to approach or recede from the conditions expressed in the preceding paragraph, and shifting the point of maximum efficiency.

These curves serve to show that

a Maximum efficiency in power and pressure are secured at or near the capacity area.
b The power per unit of volume and the pressure decrease as the discharge area and volume increase.
c With closed outlet the power is approximately one-third of that at capacity area.

From the preceding it must be manifest that no simple exact basis of calculation can be established for varying fan proportions and conditions. For all practical purposes, however, the manufacturer's basis, although only approximately correct, is sufficiently accurate.

Upon this basis Table II has been calculated to show the performance at capacity area per inch of peripheral width of typical diameters of cupola fan blowers. Basic values are taken from Table I, the air being dry, and of 50 degrees Fahr. temperature; the velocity of discharge is taken as equal to the circumferential speed of the wheel, and the power, as double the theoretical. While 50 per cent efficiency is below that which may be attained in good cupola installations, it is always desirable to provide ample surplus above the power required at capacity area. Even a change of 50 degrees from the ordinary inlet temperature makes a difference of about 10 per cent in the power.

Rotary Blowers.

Characteristic types of single and double impeller rotary blowers are presented in Figs. 3 and 4. Numerous other designs are, or have been, in use.

In the type shown in the skeleton cross-section in Fig. 3, the single im-

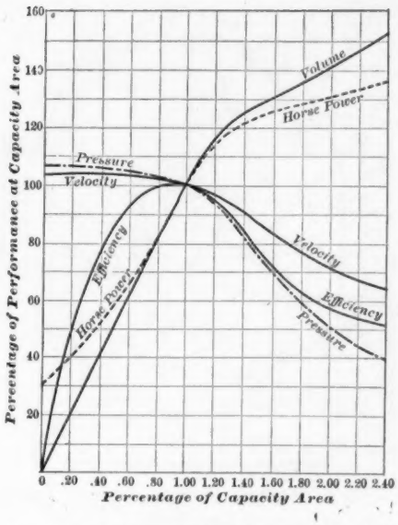


FIG. 2—RELATIVE PERFORMANCE OF A FAN AT CONSTANT SPEED WITH VARIABLE OUTLET AREA.

peller is made up of three diamond-shaped blades extending from a central web. On either side of the web a stationary core fills the space within the inner circumference of the blades, forming in connection with the enclosing case an annular space within which they revolve. The rotor which co-incidentally revolves in the smaller portion of the casing, successively provides pockets to receive and pass the revolving impeller blades to the suction side of the blower, without allowing the escape of compressed air. The rotor is in effect an idler which calls for no power expenditure other than that required to overcome friction.

In the type shown in Fig. 4, both impellers are symmetrical and counterparts of each other. The surfaces are so formed, and the impellers are so located on their respective shafts,

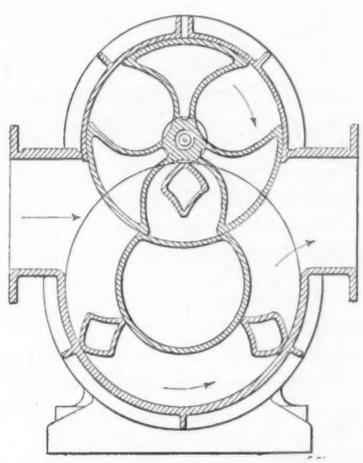


FIG. 3—ROTARY BLOWER, SINGLE IMPELLER, TRIPLE BLADED TYPE

as to permit of rotation with uniform clearance, and without metallic contact. Release of air on the discharge side of each impeller is practically coincident with the cut-off of admission on the inlet side.

In both types, the air passing through the inlet is imprisoned, and carried forward to the outlet side. Here it meets and mingles with an air of greater density, already compressed by previous action of the impellers. Equalization of pressure instantly results. As a consequence, there is more or less fluctuation coincident with the revolutions of the blower. The degree of fluctuation depends upon the ratio between the released volume and the total volume under compression, and also upon the extent to which the air has been previously compressed in transit through the blower. This occurs in the case of the single, but not of the double impeller type here illustrated.

The theoretical relations which prevail in the case of a rotary blower having a fixed free area of discharge and no slip, are identical with those already specified for the fan type operating within its capacity area, namely; the volume, and consequently the velocity, vary as the number of revolutions, the pressure varies as the square, and the power as the cube of the revolutions. But here the similarity ends, for in the fan the number of revolutions is an essential function of the pressure, while in the rotary blower they are entirely independent. In other words, material changes of total pressure with the fan type can only be secured within the capacity area by change in revolutions, while with the rotary type, great range in pressure is attainable, at constant revolutions by merely varying the resistance.

Under conditions of constant speed, and variable outlet or resistance, the performance relations of a theoretically perfect rotary blower are as follows, the effect of changes in temperature and density being disregarded:

a The volume is constant.
b The velocity varies inversely as the effective outlet area.
c The pressure varies inversely as the square of the outlet area, hence as the square of the velocity.
d The power varies directly as the pressure.

But the mechanical necessity of clearance, and the consequent slip or backward leakage, affect these relations particularly as the conditions depart from the field of maximum efficiency. The slip is theoretically, and in practice, approximately proportioned to the square root of the pressure difference between the atmosphere and the imprisoned air, that is, to the velocity which it creates. It therefore results that the volumetric efficiency decreases as the pressure increases.

Fig. 5 presents characteristic curves showing the relative performance of a single impeller blower of the type illustrated in Fig. 3. The rapid drop in mechanical efficiency at pressures below one-half pound is manifest.

The performance of a two impeller type, like Fig. 4, at different speeds and resistances, is illustrated by the curves in Fig. 6. Volumes and horsepowers are relative.

Table II.

PERFORMANCE OF CUPOLA FAN BLOWERS AT CAPACITY AREA PER INCH OF PERIPHERAL WIDTH.

Diam of Wheel Inches / Cap. Area Sq. In.	Item.	Total Pressure in Ounces Per Square Inch. 6	7	8	9	10	11	12	13	14	15	16
18 in. 6 sq. in.	r.p.m.	2660.0	2860.0	3050.0	3230.0	3400.0	3560.0	3710.0	3850.0	3990.0	4120.0	4250.0
	cu. ft.	520.0	560.0	600.0	640.0	670.0	700.0	730.0	760.0	780.0	810.0	830.0
	h. p.	1.7	2.1	2.6	3.1	3.6	4.2	4.8	5.4	6.0	6.6	7.3
24 in. 8 sq. in.	r.p.m.	2000.0	2150.0	2290.0	2420.0	2550.0	2670.0	2780.0	2890.0	2990.0	3090.0	3190.0
	cu. ft.	700.0	750.0	800.0	850.0	890.0	930.0	970.0	1010.0	1040.0	1080.0	1110.0
	h. p.	2.3	2.9	3.5	4.2	4.9	5.6	6.4	7.1	8.0	8.8	9.7
30 in. 10 sq. in.	r.p.m.	1590.0	1720.0	1830.0	1940.0	2040.0	2140.0	2230.0	2310.0	2390.0	2470.0	2550.0
	cu. ft.	870.0	940.0	1000.0	1060.0	1110.0	1160.0	1210.0	1260.0	1310.0	1350.0	1390.0
	h. p.	2.8	3.6	4.4	5.2	6.1	7.0	7.9	8.9	10.0	11.0	12.1
36 in. 12 sq. in.	r.p.m.	1330.0	1430.0	1530.0	1620.0	1700.0	1780.0	1850.0	1930.0	2000.0	2060.0	2120.0
	cu. ft.	1040.0	1120.0	1200.0	1270.0	1340.0	1400.0	1460.0	1510.0	1570.0	1620.0	1670.0
	h. p.	3.4	4.3	5.2	6.2	7.3	8.4	9.5	10.7	11.9	13.2	14.5
42 in. 14 sq. in.	r.p.m.	1140.0	1230.0	1310.0	1380.0	1460.0	1530.0	1590.0	1650.0	1710.0	1770.0	1820.0
	cu. ft.	1220.0	1310.0	1400.0	1480.0	1560.0	1630.0	1700.0	1770.0	1830.0	1890.0	1950.0
	h. p.	3.9	5.0	6.1	7.3	8.5	9.8	11.1	12.5	13.9	15.4	17.0
48 in. 16 sq. in.	r.p.m.	1000.0	1070.0	1150.0	1210.0	1270.0	1330.0	1390.0	1450.0	1500.0	1550.0	1590.0
	cu. ft.	1390.0	1500.0	1600.0	1690.0	1780.0	1860.0	1940.0	2020.0	2090.0	2160.0	2230.2
	h. p.	4.5	5.7	7.0	8.3	9.7	11.2	12.7	14.3	15.9	17.7	21.0

Comparison of the Two Types.

Under specific conditions of constant speed and resistance, it might be possible to establish the superiority of one type of blower above the other, based primarily upon first cost and operative efficiency. But conditions vary as do blowers, which for commercial reasons are built in stated sizes, from which selection must be

made. Hence the problem is complicated, and the solution becomes to a considerable degree dependent upon the intangible factor of "adaptability."

With no purpose of definition as to advantages or disadvantages, the characteristics of the two types operating within practical limits may be thus summarized and contrasted:

With a fan blower the maximum pressure is determined by the number of revolutions; with a rotary blower it depends upon existing resistance or the weighting of the relief valve.

The volume discharged by a fan blower is dependent upon the outlet area and the corresponding pressure; in the rotary type it is independent of both.

The maximum power is required when a fan blower discharges against the least, and when a rotary blower discharges against the greatest resistance.

The fan blower automatically increases the created pressure as the opposing resistance becomes greater, until it equals the maximum pressure capacity of the fan. The volume, although coincidentally decreased, is rendered effective by the greater pressure, while the power is roughly proportional to the effective work. The rotary blower is likewise automatic up to the limit of pressure temporarily established by the resistance of the relief valve, but without material change of volume, and with increase in power. Above the pressure limit set by the valve, air escapes to the atmosphere, and the power expended thereon has no useful effect.

The weight and cost of a fan blower are far less, and the speed far higher than in the case of a rotary blower; at low pressures the efficiency of the fan is superior while at the higher pressures necessary in the cupola, the rotary type excels.

As the total head or pressure created by a blower represents the sole means of producing movement of the air, whatever portion of this head is consumed in overcoming the frictional resistance of piping and fuel, reduces by just so much the amount remaining available for the production of velocity. The greater the ratio between the surface of a pipe, and the quantity, and the higher the velocity, the greater is the resistance.

Table III.

RANGE OF PERFORMANCE OF CUPOLA BLOWERS.

Diameter Inside Lining. In.	Capacity Per Hour. Tons.	Pressure Per Sq. In. Oz.	Volume of Air Per Min. Cu. Ft.	Horsepower.
18	0.25- 0.5	5- 7	150- 300	0.5- 1.5
24	1.00- 1.5	7- 9	600- 900	2.0- 6.0
30	2.00- 3.5	8-11	1,200- 2,000	5.0- 15.0
36	4.00- 5.0	8-12	2,200- 2,800	10.0- 23.0
42	5.00- 7.0	8-13	2,700- 3,700	12.0- 32.0
48	8.00-10.0	8-13	4,000- 5,000	18.0- 45.0
54	9.00-12.0	9-14	4,500- 6,000	22.0- 60.0
60	12.00-15.0	9-14	6,000- 7,500	30.0- 75.0
66	14.00-18.0	9-15	7,000- 9,000	35.0- 90.0
72	17.00-21.0	10-15	8,500-10,500	45.0-110.0
78	19.00-24.0	10-16	9,500-12,000	52.0-130.0
84	21.00-27.0	10-16	10,500-13,500	60.0-150.0

Outlet.

Were the outlet in the casing of a fan blower to be made equivalent to the capacity area, the velocity and corresponding friction would be excessive. But in both the fan and rotary types, the area of the outlet is such that the velocity of discharge seldom exceeds 3,000 feet per minute. Even this is so great that material saving in power may be secured in a long pipe by making its area considerably in excess of the blower outlet. For instance, the frictional loss in 100 feet of 10-inch pipe with 3,000 feet velocity will be practically one ounce; while that in a 12-inch pipe, passing about the same volume at 2,000 feet velocity, will be approximate ⅜ ounce.

If a certain velocity pressure is required at the point of final delivery, it is manifest that the blower, if in a distant location, must create a total pressure sufficiently in excess to allow for the loss by friction. A drop of a couple of ounces is not uncommon with an ordinary piping system.

Volume Determination.

The actual conditions in a conduit may be determined by a Pitot tube, and calculations of volume made therefrom. The most satisfactory form of instrument appears to be that devised by Mr. D. W. Taylor, and described in his paper before the Society of Naval Architects and Marine Engineers, November, 1905. Care must be exercised in the use of any form of pressure gage in order to avoid misleading readings. This is particularly true regarding determination of pressure in the wind-box of a

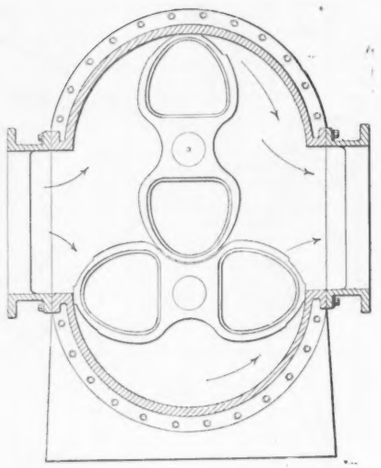


FIG. 4—ROTARY BLOWER, DOUBLE IMPELLER TYPE

cupola, wherein the direction of air currents is uncertain.

The modern cupola furnace is typical of metallurgical progress in which conservation of heat has been secured by massing fuel and metal.

It would at first appear that equal facility was provided for securing complete combustion, and that the quantity of air furnished might closely approximate the chemical requirements. But to secure the best results the volume is reduced in practice considerably below that theoretically required; of necessity incomplete combustion results. The conditions are closely similar to those in the blast furnace.

The reason for this condition is to be found in the arrangement of the superimposed charges of fuel and metal with relation to the air supply, which necessitates passing through the lower charges all of the air required for those above. Although per-

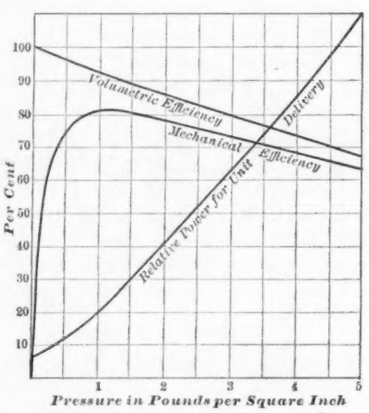


FIG. 5—RELATIVE PERFORMANCE OF A SINGLE IMPELLER ROTARY BLOWER AT CONSTANT SPEED WITH VARIABLE RESISTANCE

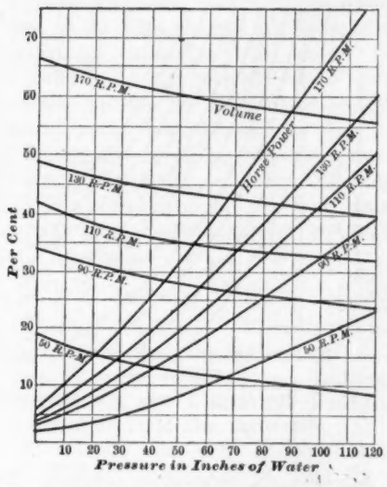


FIG. 6—RELATIVE PERFORMANCE OF A DOUBLE IMPELLER ROTARY BLOWER AT VARIOUS SPEEDS AND PRESSURES

fect combustion with an excess of air is thereby secured in the melting zone, the tendency of excessive dilution is to cool the gaseous mixture to a temperature even below that of the molten iron. Under such conditions less heat is transferred to the upper charges, because of the higher velocity and lower temperature of the gases.

The air supply to a cupola is not, therefore, to be determined by the chemical requirements of the entire body of fuel, but by the excess which the lower charges are able to endure without disastrous cooling. The level of the ignition zone, and the completeness of combustion, are necessarily limited by this excess.

The introduction of two or more rows of tuyeres with large aggregate area, has served to distribute the air admission, to reduce the cooling effect in the melting zone, to raise the level of the ignition zone, and to perfect the combustion.

Gases.

Authoritative chemical analyses of the escaping gases are exceedingly rare, but such as are available show that only about 50 per cent of the carbon combines to form carbon dioxide. The balance escapes as an element of carbon monoxide having less than one-third of the heat value. In other words, only about two-thirds of the possible heat of combustion is utilized. This indicates a shortage of about 25 per cent in the air supply.

The intermittent operation of the ordinary cupola is not conducive to the ready utilization of the waste heat by external means, as is possible in the case of the blast furnace. Further economy is therefore to be sought within the cupola itself, and in the application of the blower thereto, presumably along the lines in which improvement has already been made.

The air supply to a cupola is usually expressed in cubic feet per net ton of iron melted. The amount necessarily varies with the melting ratio, the density of the charges, and the incidental leakage. Fair average practice is represented by the following:

					Per ton of iron.
6	lbs.	iron	per	lb. coke,	33,000 cu. ft. air
7	lbs.	iron	per	lb. coke,	31,000 cu. ft. air
8	lbs.	iron	per	lb. coke,	29,000 cu. ft. air
9	lbs.	iron	per	lb. coke,	27,000 cu. ft. air
10	lbs.	iron	per	lb. coke,	25,000 cu. ft. air

It is customary to provide blower capacity on a basis of 30,000 cubic feet, which corresponds to 75 or 80 per cent of the chemical requirements with average coke, and a melting ratio of 7.5 to 1. This is evidently ample for any higher ratio.

Obviously, neither the rate of combustion, nor the rate of melting, can remain constant under the varying conditions within the cupola. In fact, it is not fundamentally necessary that they should. But the blower is usually run at constant speed, and delivers uniform volume except as reduced by resistance.

As a rule this reduction, which occurs only in the case of the fan, is relatively slight, for the volume (of which the velocity is a function) varies as the square root of the pressure. Hence, for instance, a 20 per cent drop in pressure entails only about 10 per cent loss in volume. Fairly constant pressure with a more regular, though not uniform volume, is therefore to be expected in fan blower cupola practice, as well as a moderate melting rate due to delayed combustion, resulting from reduction in air supply coincident with increase in resistance.

Resistance.

As ordinarily installed the resistance of a cupola will never exceed the pressure which a rotary blower can create if sufficient power is supplied. If no relief valve is provided, or it is set high enough to prevent escape, all air must be discharged through the cupola, hence the volume will be practically constant. As the pressure equals the resistance, considerable variation is to be expected during the heat, while, owing to the maintenance of uniform air supply, a more rapid rate of melting may be possible than with the fan.

These expectations are usually fulfilled in practice, although the contrast lessens as the proportioning of the blower to the cupola approaches the ideal. So far as the blower is concerned, its actual volumetric output, relatively to the cupola requirements, is the determining factor in the melting rate.

Operations Compared.

For the purpose of illustration, extreme contrasts between the operation

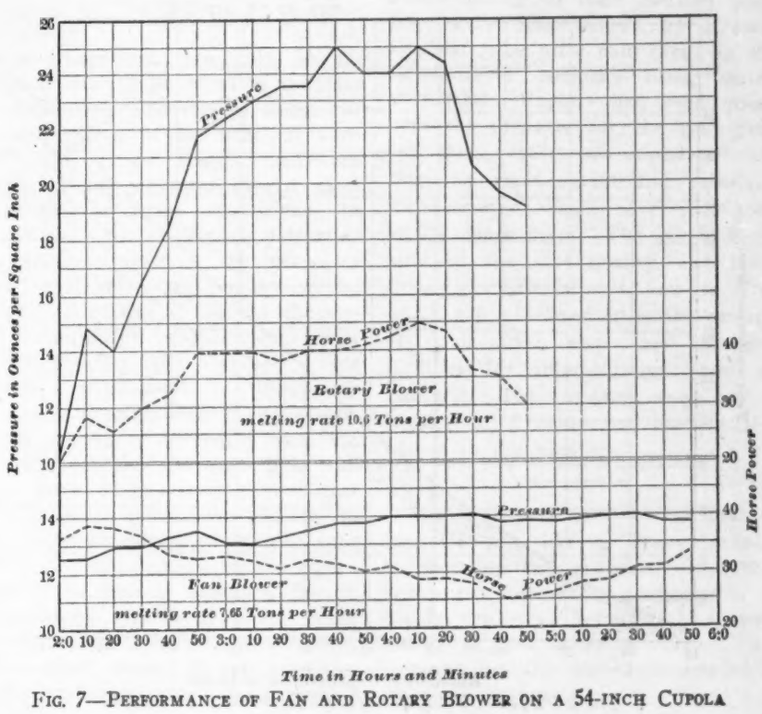


FIG. 7—PERFORMANCE OF FAN AND ROTARY BLOWER ON A 54-INCH CUPOLA

of a fan blower and a rotary blower are graphically presented in Fig. 7. These curves are based on tests reported by Mr. H. E. Field at the December, 1904, meeting of the Pittsburg Foundrymen's Association. The blowers, a No. 10 Sturtevant fan and a 33-cubic-foot Connersville rotary, were installed for alternate use in connection with a 54-inch lining cupola. So far as possible the charges were alike in weight and character in both cases. The scrap was heavy, and of such shape as to pack closely. These tests will be made the basis for some pertinent comparisons.

Here are practically identical conditions of cupola and contents, but great contrasts in operation which show the effect of variation in air volume and pressure. With the fan blower the pressure was comparatively constant, the variation being between 12½ and 14⅛ ounces in the wind box with an average of 13.6. The net power ranged from 25 to 38.5 horsepower, with an average of 31.2. The pressure with the rotary blower varied through the extreme range between 10½ and 25 ounces, while the average stood at 20.63. The variation in horsepower was between 19 and 45, the average being 35.8.

With the fan 28.84 tons were melted in 3.77 hours, at the rate of 7.65 tons per hour, while with the rotary blower 2.82 hours were required to melt 31.5 tons, at an hourly rate of 10.6 tons, an increase of nearly 40 per cent in output. This reduces to a net input of 4.09 horsepower per ton melted per hour with the fan, and 2.98 horsepower with the rotary blower; an apparent advantage of 27 per cent in favor of the rotary.

By far the larger quantity of air was discharged by the rotary blower, the rate of melting being closely proportional to the volume, as may be shown by a careful analysis of the tests. The rate is low for the size of the cupola, extremely so in the case of the fan, and is in part at least the result of excessive resistance presented by large pieces of scrap.

The results shown by these tests emphasize the possible effect of changes in the relation of the blowers to the cupola. Had the rotary blower been of smaller capacity such excessive pressures would not have been necessary to force the constant volume through the cupola; the power would have been decreased, and the duration of the heat prolonged, with probable decrease in the horsepower hours per ton. Had the fan been run at higher, but not excessive, speed, to permit of passing a larger volume, which it was fully capable of delivering, the horsepower would have increased, the time decreased and the power per ton per hour would certainly have more closely approached that required by the rotary blower.

Another Test.

A subsequent unofficial, but credible, test made upon the same cupola equipped with a No. 8 Sturtevant fan

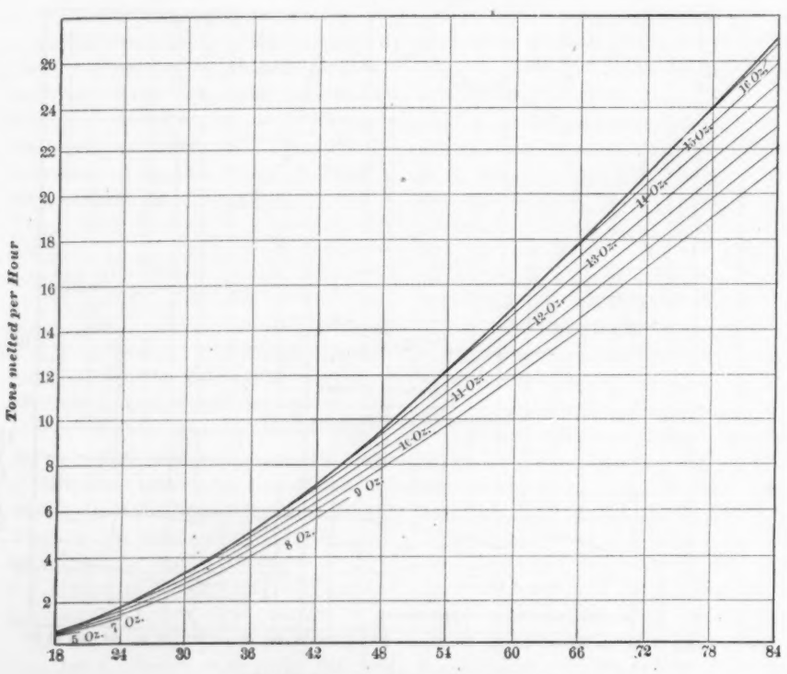


FIG. 8—CUPOLA PERFORMANCE AT DIFFERENT PRESSURES

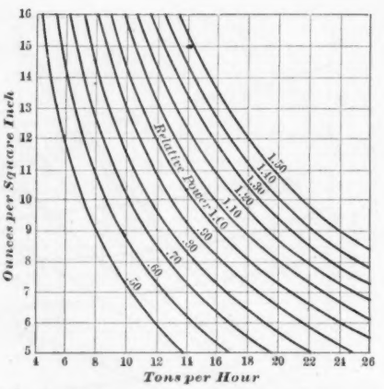


FIG. 9—ROTATIVE POWER FOR DIFFERENT PRESSURES AND MELTING RATES

presents an instructive contrast. The conditions were identical with those in the previous tests, except that a small amount of very light scrap was charged. The results showed 9.41 tons melted per hour with an average pressure of 12.5 ounces and a power expenditure per ton per hour less than 80 per cent of that required with the No. 10 fan.

The preceding renders manifest the difficulties in the way of exactly proportioning blowers to the somewhat unknown conditions of their work, and likewise the futility of attempting to base comparisons of ultimate efficiency upon such limited experiments. In contrast thereto, it can be shown that a No. 10 Sturtevant fan, upon a 60-inch cupola, regularly melted 13.8 tons per hour, with an expenditure of 2.6 horsepower per ton, and a No. 8, upon a 42½-inch, required only 2.9 horsepower per ton upon a total output of 6.46 tons per hour. And likewise that rotary blowers of identical size and quality have shown results both inferior and superior to those here reported.

The higher speed of melting, which because of its ability to overcome excessive resistances, may be maintained by the rotary blower, is universally recognized, as is also the increased time thus rendered available for molding before the first iron is tapped. But the greater pressure incident to the higher rate is much more severe in its cutting effect upon the lining, while the value of the time gained for molding depends upon individual foundry conditions. The superior mechanical efficiency of the rotary type is, to a greater or less degree, offset by much lower first cost and fixed charges on the fan. The necessity of providing power capacity greatly in excess of the average in the case of the rotary blower is not to be overlooked. Neither is

it to be forgotten that the brief duration of the heat reduces the difference in annual expenditure for power to a relatively unimportant item. For instance, under the exceptional conditions in the tests shown in Fig. 7, the daily difference in electrical horsepower hours input was only 20.3. On a basis of 10 hours per day this equals only two horsepower continuously exerted.

Melting Ratio.

Theoretically, for otherwise constant conditions, the following relations hold for cupolas and melting rates within the range of practical operation:

a The melting rate with constant volume varies directly as the square of the diameter, that is, as the cross sectional area of the cupola, and directly as the volume, as the square root of the pressure, and as the cube root of the power for a given cupola.

b The volume varies inversely as the square of the cupola diameter for a given melting rate, and directly as the melting rate for any cupola.

c The pressure with a given cupola varies directly as the square of the volume, that is, as the square of the melting rate, and as the depth of the charges for a given melting rate.

d The power with a given cupola varies directly as the cube of the melting rate, and as the cube of the square root of the pressure, and directly as the pressure for a given melting rate and any cupola, i. e., inversely as the fourth power of the diameter for a given melting rate.

e The power per ton per hour (the operating efficiency) for a given cupola varies directly as the square of the melting rate, that is, as the pressure; and for a given melting rate directly as the rate for a given pressure, directly as the pressure and inversely as the fourth power of the diameter.

f The duration of the heat for a total output for a given cupola varies inversely as the square root of the pressure.

These relations might well be the source of numerous formulae for practical use were it possible to establish accurate coefficients. But the great variety in cupolas, tuyerage proportions, and character of fuel and iron, to say nothing of the difference in charging practice in different foundries, or even the variety in the same foundry, are bewildering and discouraging. Maximum efficiency in a given case can only be assured after direct experiment. But something short of the maximum is usually accepted in ignorance of the ultimate possibilities. But even though subject to some variation under working conditions, the preceding relations point clearly to the factors that make for maximum efficiency. It is obvious that pressure and melting rates should be as low, and cupola diameters as great as practical considerations will allow.

High Pressure.

High pressure is a relic of small tuyere area. The tendency is distinctly in the line of more moderation, both because of higher ultimate operating efficiency, and the improved quality of the castings.

Figs. 8 and 9 clearly indicate the economy of such a course. It is to be noted that although the curve of maximum output in Fig. 8 is freely drawn through points representing good current practice, it conforms closely to the relations expressed above, i. e., that the melting rate varies directly as the square of the diameter. Wide variations are to be expected in individual cases. The maximum pressures capable of maintaining the corresponding melting rates under proper conditions vary with the diameter and the height of the cupola, as well as with the proportions of the charges. Other melting rates are plotted in proportion to the square roots of lesser pressures for corresponding cupola diameters.

Low Pressure.

The power economy of low pressures and melting rates is clearly shown by Fig. 9. The lines of unit expenditure have been arbitrarily fixed in the middle field of good practice.

The actual melting range of a cupola is ordinarily between 0.6 and 0.75 ton per hour per square foot of cross section. The limits of air supply per minute per square foot are roughly 2,500 and 4,000 cubic feet, with the mean as representative of fair practice. The possible power required varies even more widely, ranging from 1.5 to 3.75 horsepower per square foot, corresponding respectively to 2.5 and 5 horsepower per ton per hour for the melting rates specified above.

Current practice can only be expressed between limits as in the case of Table III. Therein is given the ordinary range of the different variables for stated cupola diameters. The specified pressures prevail most extensively in recent installations. In so far as it is possible to determine the melting rate and the necessary pressure therefor, the power may be roughly calculated, from the theoretical requirement of 0.27 horsepower to deliver 1,000 cubic feet per minute against 1 ounce pressure. The power increases directly with the pressure, and is practically dependent upon the efficiency of the blower. This will range from 50 to nearly 70 per cent in a good fan installation, and up to a possible maximum of 90 per cent with a first-class rotary blower equipment. The drop in pressure due to an extended system of piping must not be neglected in such calculations.

The trend toward lower pressures in the cupola is reflected in currrent air furnace practice. The high pressure fan blower with small volumetric capacity has been superseded by the volume fan having ample capacity at much lower pressure.

Both volume and pressure are dependent upon the quality of the coal and the rate of combustion. The deep fire lends itself to complete utilization of the air supply, with minimum excess and maximum temperature. Both under and over grate supply pipes should be of ample size to avoid excessive loss by friction, and the pressure should be the lowest which, with a properly proportioned blower, will pass the required volume. This pressure need not exceed 2½ ounces per square inch, and under good conditions should be considerably less. The volume delivered beneath the fire may be kept well down toward the theoretical requirements, not exceeding 200 to 225 cubic feet per pound of coal.

In the crucible furnace still lower pressures prevail but the air supply is not as effectively utilized.

IRON LANDS LEASED.

The Londonderry Iron & Mining Co., representing the same interests as the Drummond Mines Co. of Montreal, has leased extensive iron ore deposits in Gloucester county, N. B., located on the Nepisquit river, 11 miles from Bathurst, and will proceed with the development forthwith. The smelter will probably be located at Bathurst. The deposits, the existence of which were known only to a few owing to their isolated position, were first secured by a local syndicate, the price paid them by the Londonderry company being stated at $80,000. Experts had been going over the property for the past year and their reports are stated to confirm the great extent and value of the property, which covers an area of 25 square miles. The ore is hematite of the best quality, and tests show a depth of 324 feet of ore, which can be mined from the surface at small cost. There are excellent facilities for shipment by water at Bathurst. The company must pay a royalty of 5 cents per ton on the output to the company.

The Columbus & Hocking Coal & Iron Co. now has its Bessie furnace in operation and orders now on the books give reasonable assurance of a steady run until Jan. 1. A special quality of iron is being made. The company has also placed its new brick plant in operation.

SOME REMARKABLE BOILER TESTS.

The Rust Boiler Co., Pittsburg, is distributing a pamphlet containing a report of two tests made on the Rust water tube boiler at a plant in Pittsburg by Dr. William Kent, of Syracuse University. The tests are remarkable on account of the great capacity and high economy obtained.

We quote from Dr. Kent's report:

I believe that the efficiency results are within three per cent of the highest that are theoretically possible with Pittsburg coal in any boiler fitted with any kind of stoker and not provided with an economizer, and that they are about as high as can ever be expected in every day practice, even with the most skillful handling of a stoker or with the best hand firing.

The results, high as they are, can undoubtedly be duplicated at any time * * * when the same conditions under which these tests are made can be obtained, viz., uniform rate of driving, without having to shut off the draft at any time during the day to lower the steam pressure and without having to force the fires to raise the pressure; the boiler clean inside and out; a firebrick furnace; an automatic stoker; the brickwork free from leaks of air; the draft and rate of feeding the coal adjusted to each other so as to burn the coal without smoke and without any greater excess of air than is necessary for complete combustion; practically no loss of unburned coal through the grate bars.

The coal used was run-of-mine, containing lumps of all sizes from three-inch cube down to fine slack, and was of the quality regularly used in the works. The thermal value of the coal differed on the two days of the tests, being 15,161 B. T. U. and 15,564 B. T. U. per pound, respectively.

Dr. Kent, in his report, says regarding draft:

A study of the conditions of draft in the furnace and flue, as shown by an Ellison or other multiplying draft gage may be of considerable service in leading to improving both the capacity and economy of a boiler plant. The draft in the stack, the atmospheric pressure under the grates, and the resistance to the passage of gas through the boiler structure are all nearly constant for a given boiler. The principal variable condition is the resistance offered by the coal on the grate, and this condition is indicated by the reading of the two draft gages at the furnace and the flue between the boiler and the damper. When the difference between the readings is smaller than normal, it indicates that a small quantity of gas is passing through the boiler structure, which may be due to a choked grate and this indication is confirmed if the draft in the furnace is higher than normal. If the difference is greater than normal and the draft in the furnace is light, there is too thin a bed of coal on the grate or on part of it, and an excessive quantity of air is passing into the furnace.

An important lesson that may be drawn from a record of this character is that of the great advantage afforded by a high stack giving a strong draft which may be controlled by a damper. When the furnace is choked with too thick a bed of coal or ashes the draft in the furnace automatically increases, tending to pull the proper quantity of air through the fire, provided there is a sufficient draft at the stack available. When the fire is thinner than normal, the furnace draft automatically reduces, and the draft in the flue reduces and the rate of burning becomes normal.

We append below the record of the two tests, presented in the short form of the American Society of Mechanical Engineers' code. It will be noted that the earlier test was made to determine capacity and the boiler was run at 210.5 per cent of its rating; in the second test made to determine economy, the boiler was run at 105.1 per cent of its rating and developed an efficiency of 75.85 per cent.

Data and Results of Evaporative Tests.

	Made by		William Kent
	At		Pittsburg, Pa.
	On		December 21 and 22, 1906.
	To determine		Capacity and Economy, respectively.
	Kind of fuel		Pittsburg Bituminous Coal, No. 3 Pool.
	Kind of furnace		Roney Stoker.
	Method of starting and stopping the test		Running.
	Grate Surface		68 sq. ft.
	Water-heating Surface		3,350 sq. ft.
	TOTAL QUANTITIES.		
1.	Date of trial	Dec. 21, 1906.	Dec. 22, 1906.
2.	Duration of trial, Hours.	8	10
3.	Weight of coal as fired, Lbs.	21,310	11,850
4.	Percentage of moisture in coal, Per cent	3	2.47
5.	Total weight of dry coal consumed, Lbs.	20,671	11,567
6.	Total ash and refuse, Lbs.	2,747	1,620
7.	Percentage of ash and refuse in dry coal, Per cent	13.29	14.01
8.	Total weight of water fed to the boiler, Lbs.	160,418	100,079
9.	Water actually evaporated, corrected for moisture or superheat in the steam, Lbs.	159,087	99,379
9a.	Factor of evaporation	1.2235	1.2227
10.	Equivalent water evaporated into dry steam from and at 212 degrees, Lbs.	194,643	121,511
	HOURLY QUANTITIES.		
11.	Dry coal consumed per hour, Lbs.	2,583.9	1,156.7
12.	Dry coal per sq. ft. of grate surface per hour, Lbs.	38.00	17.01
13.	Water evaporated per hour, corrected for quality of steam, Lbs.	19,886	9,937.9
14.	Equivalent evaporation per hour from and at 212 degrees, Lbs.	24,330	12,151.1
15.	Equivalent evaporation per hour from and at 212 degrees per sq. ft. water heating surface, Lbs.	7.26	3.63
	AVERAGE PRESSURES, TEMPERATURES, ETC.		
16.	Steam pressure by gage (corrected), Lbs. per sq. in.	137	132
17.	Temperature of feed water entering boiler, Degrees	42	42
18.	Temperature of escaping gases from boiler, Degrees	718	503
18a.	Force of draft at base of stack, Ins. of water	1.05	1.1
19.	Force of draft between damper and boiler, Ins. of water	0.72	0.32
19a.	Force of draft over fire, Ins. of water	0.34	0.17
19b.	Force of draft in ashpit, Ins. of water		
20.	Percentage of moisture in steam	0.83	0.70
	HORSEPOWER.		
21.	Horsepower developed (Item 14 ÷ 34½), H. P.	705.2	352.2
22.	Builders' rated horsepower, H. P.	335	335
23.	Percentage of builders' rated horsepower developed, Per cent	210.5	105.1
	ECONOMIC RESULTS.		
24.	Water apparently evaporated under actual conditions per lb. of coal as fired, Lbs.	7.528	8.445
25.	Equivalent evaporation from and at 212 degrees per lb. of coal as fired, Lbs.	9.134	10.254
26.	Equivalent evaporation from and at 212 degrees per lb. of dry coal, Lbs.	9.416	10.505
27.	Equivalent evaporation from and at 212 degrees per lb. of combustible, Lbs.	10.859	12.216
	EFFICIENCY.		
28.	Calorific value of the dry coal per lb., B. T. U.	13,202	13,428
29.	Calorific value of the combustible per lb., B. T. U.	15,161	15,554
30.	Efficiency of the boiler (based on combustible), Per cent	69.17	75.85
31.	Efficiency of boiler, including grate (based on dry coal), Per cent	68.88	75.55

A MACHINE FOR FORMING PIPE ELBOWS.

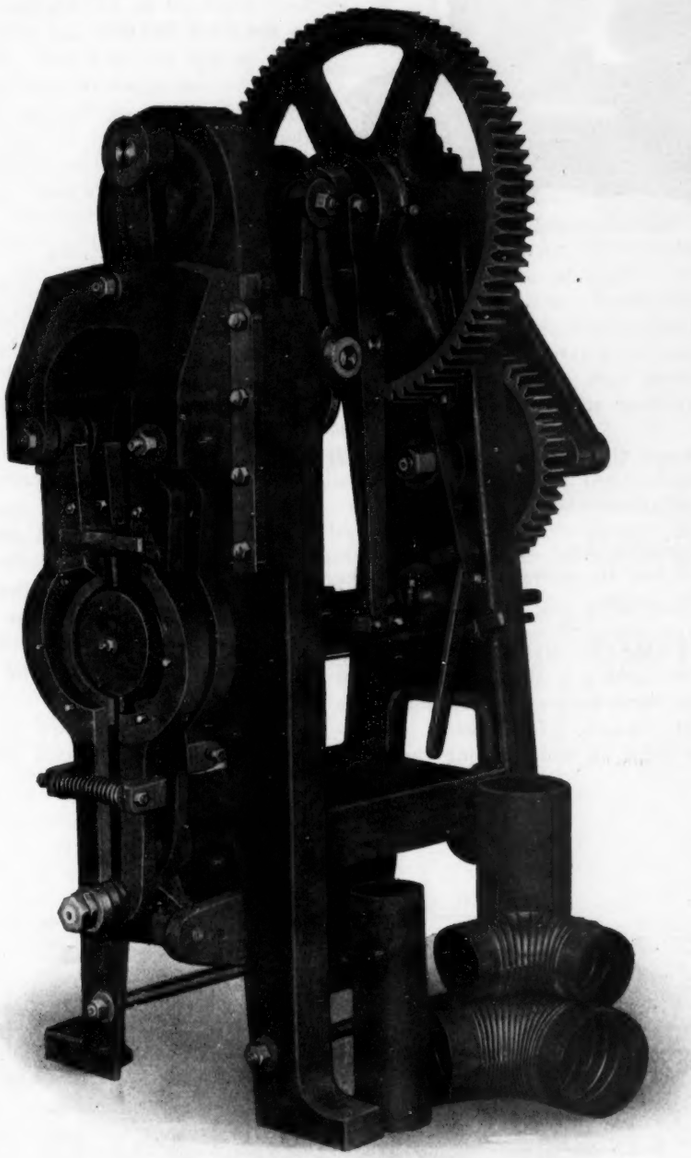
We illustrate herewith a new pattern of a machine for making stove pipe elbows. The machine, which has been designed and built by the Toledo Machine & Tool Co., Toledo, is almost entirely automatic and is designed for making elbows from 4 to 7 inches inclusive. It is fitted with an automatic clutch and the operator has only to start it, which is accomplished by engaging the clutch by means of the hand lever shown. After the machine has traveled its required distance, it is stopped automatically.

For making the elbows plain straight pipe or cylinders only are required. These cylinders are first prepared by rolling up plain straight sheets and having the two ends of the sheets lap about ½ inch. One end of the pipe can be riveted or the lap can be left loose as desired. The plain cylinder is then placed on the round horn into the machine, and into a chuck which also forms the shoulder or stop. This chuck is a plain ex-

panded ring which is contracted by means of a small hand lever and screw for clamping onto the cylinder or pipe. The gear on the rear of the machine engages with a pinion on a shaft, which runs through the horn for operating the expanders.

The long, narrow, vertical lever passes down from the cam on the top shaft and engages with the horizontal bar which also forms the rack feed, and the pipe or cylinder is fed forward the required distance at each revolution of the machine by the cam actuated movement on the upper shaft.

As the crank on the front end of the top shaft makes one revolution and the hood descends, the rolls in the hood engage with the two pair of steel arms in front of the machine, which are fullcrumed at the lower end, and close these arms tightly on the cylinder, which has been previously fed forward on the horn over the expanders. As the machine continues to operate, the expanders in the front portion of horn are forced outward forcing up on the one side of the elbow the required amount of metal. After this operation the front cam on the top shaft previously referred to and in which the rolls and clevice engage pulls back the front pair of arms in front of the machine; these fold up tightly that part of the metal of pipe or cylinder which has previously been forced out by the expanders. These several operations performed at one revolution of the machine by means of the automatic cam-actuated movements, previously referred to, form the one corrugation. The pipe is fed forward the 12, 13 or 14 spaces required for the corrugations necessary; the elbow is formed and completed in this manner, and automatically fed out of the machine. The machine stops automatically at the completion of the last corrugation or rib. The work is performed at the rate of about 60 to 75 ribs per minute, making it possible to form approximately 200 elbows per hour. The labor cost in making elbows from the plain pipe is reduced to a minimum as it is not necessary to clinch or close the seams prior to this operation.

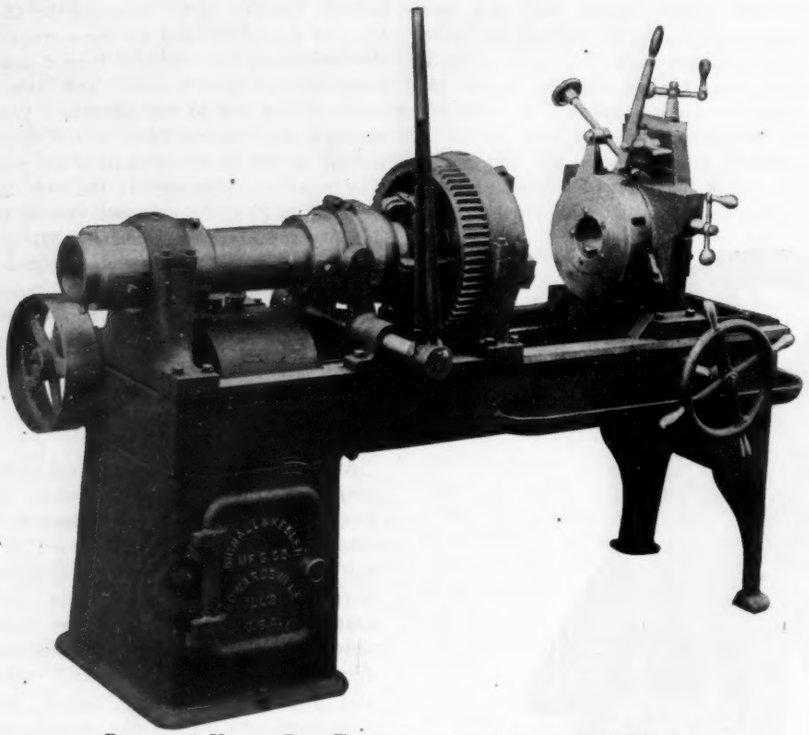


Toledo Press for Forming Pipe Elbows.

ARRANGE RECIPROCAL DEMURRAGE.

At a conference of the general managers of the leading railroads in Texas, with representative shippers, a number of new rules to govern demurrage on the part of the shippers were adopted. The legislature had passed a law authorizing the state railway commmission to fix reciprocal demurrage rates and establish rules and regulations. Final action was postponed until after the conference. Under the agreement it is to be recommended to the commission that the railroads shall have five days in which to meet orders for cars in lots not to exceed five, and an additional day for each additional car, a penalty of 50 cents a day being attached. The shippers are to pay the same demurrage as at present, $1 per day over 48 hours. The carriers must pay 50 cents a day for failure to place cars for unloading, and the minimum daily movement of cars shall be 25 miles, and the penalty 50 cents per day. It is recommended that the roads be exempt from the penalties in case of accident, and shippers exempt from demurrage in case of bad weather. The railroads also agree that the shipping interests of the state be permitted to appoint a representative on the Texas Car Service Association.

Work has been started on the new machine shop which will be used by the Portsmouth Steel Co., Portsmouth, O., in connection with the bar mill. Mr. Scholl, who will manage the Otis Spencer tie plate mill now being constructed at the Portsmouth Steel Co. plant, is making periodical visits to Portsmouth to watch the progress of construction on the mill. The tie plate to be manufactured will be placed on top of the tie to fasten it to the rail. The steel company will supply the Otis Spencer people with fuel and steam and furnish steel on contract for a period of years.



BIGNALL & KEELER PIPE THREADING AND CUTTING-OFF MACHINE.

IMPROVED PIPE THREADING AND CUTTING-OFF MACHINE.

The accompanying illustration presents a view of the P. D. Q. C. No. 3 type of pipe threading and cutting-off machine manufactured by the Bignall & Keeler Co., Edwardsville, Ill., and recently improved. This machine is particularly adaptable to classes of work where large quantities of pipe of one size are to be cut and threaded. The operations of cutting and threading procced continuously without stopping the machine as the quick speed changes are manipulated easily and quickly by means of levers, the gripping chuck with which the tool is equipped can be controlled while in motion by a simple lever movement. The driving pulley runs at constant speed, thus transmitting a constant power to the machine, and the arbor speeds are obtained through a gear box. The enclosed gears are machine cut and run in oil and the position for the levers for each size of pipe being indicated on the tool. One upward movement of the die lever serves to release them from the pipe and this simple device is characteristic of the speed and convenience of the tool. The moving parts of this machine are made of fine grade steel wherever advisable and are mounted on a strong and stable box frame. Pipe from ¼-inch to 3 inches diameter can be handled, the tool is designed for a countershaft speed of 250 revolutions per minute, occupies a floor space 3 feet wide by 5 feet 10 inches long and weighs 2,700 pounds.

AUTOMATIC NIPPLE MACHINE.

The making in the machine shop of such pieces as nipples has undergone great changes. The manner of cutting them off and theading them and the number of operations required to do this have been modified to save time as tools for this purpose have been developed. The Crane Co., Chicago, is now operating in its shops several machines of a new design shown in the accompanying illustration, Fig. 1, which represent as rapid and ingenious a device as has been perfected up to this time. It is an automatic machine and will handle from ⅛-inch to 2-inch pipe. The machine has an appearance of complexity given to it by the gearing but the idea of the tool is very simple.

The pipe, supported in a rack, is fed into the machine through an automatically operated four-jaw chuck, which is keyed on the hollow main spindle of the tool. The feeding pressure on the pipe is obtained from a suspended weight and transmitted in the direction of the pipe by means of rope and pulleys. The chuck jaws are operated by a cam mechanism, releasing to allow the pipe to move ahead against the stopper and closing to hold it during the threading, cutting off and chamfering operations. These three operations are simultaneous. As shown in Fig. 2 the thread for the two consecutive nipples on the adjoining ends is continuous and is being formed at the same time that the cutting off tool is cutting off the preceding nipples as shown in Fig. 2 also. The chamfering tool is set opposite the cutting off tool and faces

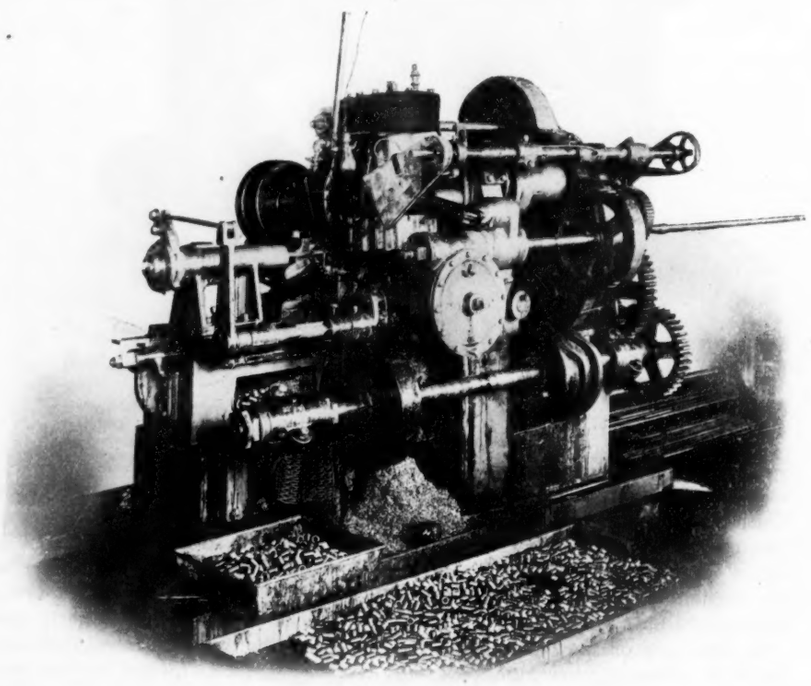


FIG. 1—AUTOMATIC NIPPLE MACHINE.

off the burrs on the end of the nipple as the pipe is cut through.

The cutting of the thread is done by solid dies set in four continuously revolving heads as indicated in Fig. 2.

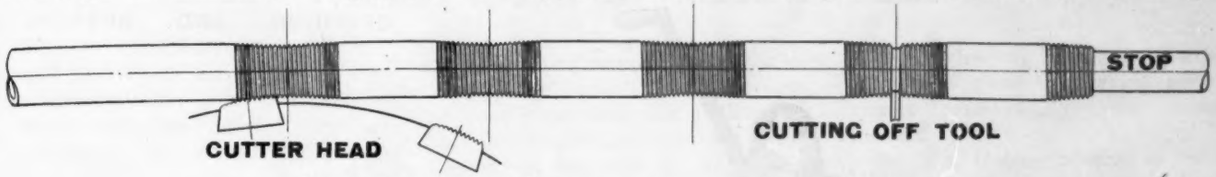


FIG. 2—FORMATION OF NIPPLES IN AUTOMATIC NIPPLE MACHINE.

The cutter heads are arranged one in each quadrant as shown in Fig. 3 so that there are four dies cutting simultaneously, completely forming the thread and in the minimum of time. In each head there are 11 dies equidistant around the circumference, so that one revolution of the head is coincident with the making of 11 nipples. The heads are adjustable and removable for various size pipe. The dies are laid out on the circumference of a circle whose radius—the radius of the cutter head—is such that the arc of contact between the die and the pipe in accordance with which curvature the thread is cut as shown in Fig. 2, is the nearest possible approach to the standard taper for pipe threads of the size being cut. In the short length of thread required, the difference between the taper obtained as in this machine and that cut by chasing an ordinary die over the thread is absolutely negligible. The dies are adjustable in the heads and when grinding is necessary the head is taken out and the dies sharpened in place.

The method of driving the cutter heads is clearly shown in Fig. 1, where the driving mechanism for one head is shown in the center and front of the illustration. The spur gear on the right drives a worm shaft which communicates the motion to a worm wheel driving the cutter head shaft. The motion comes primarily from a single gear on the main spindle which is driven by a pulley located between the chuck and the gear train from a single pulley overhead. The cutting speed is therefore constant and the timing of the various operations of the different parts of the machine is absolutely positive. The cams for operating the jaws of the chuck and the cutting off tool are shown on the lay shaft in the front of the machine. The cutting speed is about 70 feet a minute and the machine will make for example ⅜-inch nipples at the rate of 12 a minute. A separately driven pump provides a positive oil feed for the machine and the photo above was taken of the machine in operation. The nipples are all inspected and tested on a standard gage before being accepted. The use of such an expensive machine as this for this class of work is a striking instance of the scale on which Crane Co. conducts its operations.

AMONG THE INDUSTRIES OF INDIANA.

(Special Correspondence.)

Indianapolis, Ind., Dec. 6.—Repairs have been completed at the Midland mill of the American Sheet Steel Co., Muncie, which has been shut down several weeks. The plant is awaiting orders to resume operations.

Representatives of practically every railroad doing business in Indiana met in this city recently to discuss a debit and credit demurrage system. Such a system was petitioned for by the Indiana Bridge Co.

The wire and nail mill at Muncie, operated by Kitsselman Brothers, has resumed operations. There seems to be a decided improvement in the financial situation throughout the state and a number of plants are reopening.

A fire caused a loss of $7,000 at the plant of the Anchor Stove & Range Co., New Albany, Nov. 17. The fire was of incendiary origin.

On the complaint of the Michigan Electric Co., Albert G. Harlin has been appointed receiver for the Indiana Foundry & Machine Co., at South Bend, Ind. It is charged that the liabilities are about $12,000 with $8,000 assets.

The Atlas Engine Works and the Nordyke and Marmon Co. of this city, which recently laid off a large number of men, are expected to resume operations with their full forces within a few days. Each concern laid off several hundred men, but the plants did not close down entirely.

The Brown-Ketcham Iron Works of this city is executing a large contract for the iron work in the new I. O. O. F. Grand Lodge Temple being erected here.

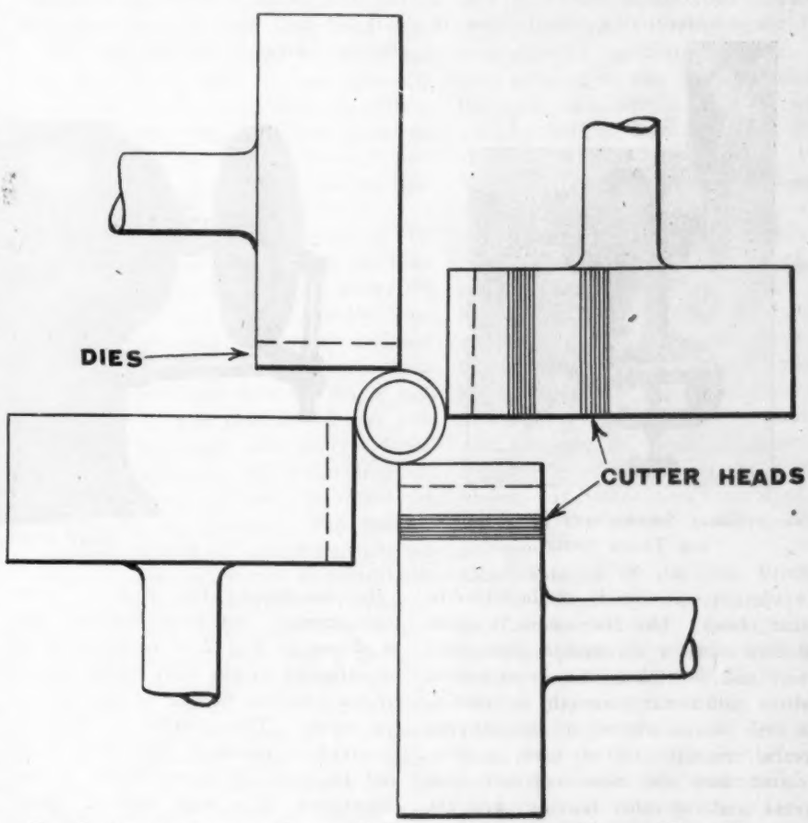


FIG. 3—ARRANGEMENT OF CUTTER HEADS IN AUTOMATIC NIPPLE MACHINE.

NEW "CLIMAX" TRACK DRILL.

A design affording greater strength and material calculated to give greater durability have been embodied in the new track drill now being manufactured by the Cook's Standard Tool Co. of Kalamazoo, Mich. The drill is shown in Fig. 1 of the accompanying illustrations in an upright position. It can be folded to clear trains. The framework is made of fine quality malleable iron and steel and is ribbed and cross-braced where additional strength is needed. In the manufacture of the driving gears, crucible steel is used as contrasted with the more common iron gears, and the other moving parts are made of Bessemer steel. The drill is provided with an automatic feed mechanism whose design, bearings and driving connections are specially intended to reduce friction to a minimum. The bit is provided with a quick return device which largely increases the capacity of the tool and the drill chuck is made to accommodate all drill diameters. Chucks can also be furnished for flat drill bits.

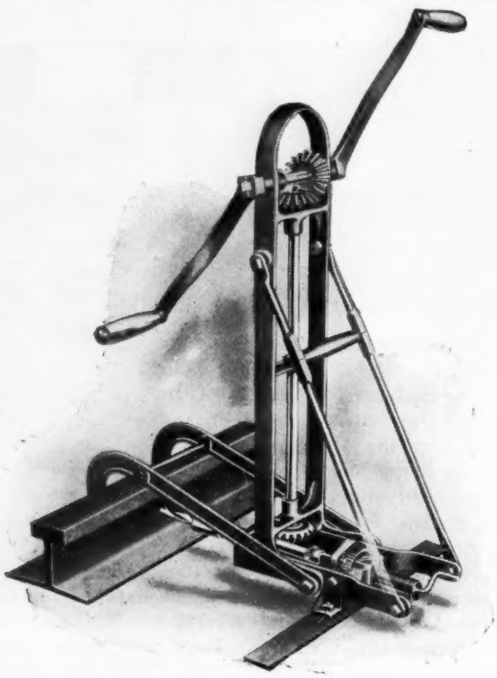


FIG. 1—CLIMAX TRACK DRILL.

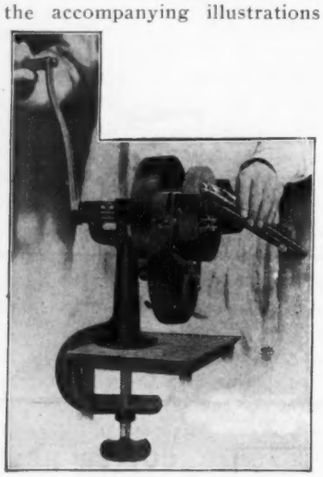
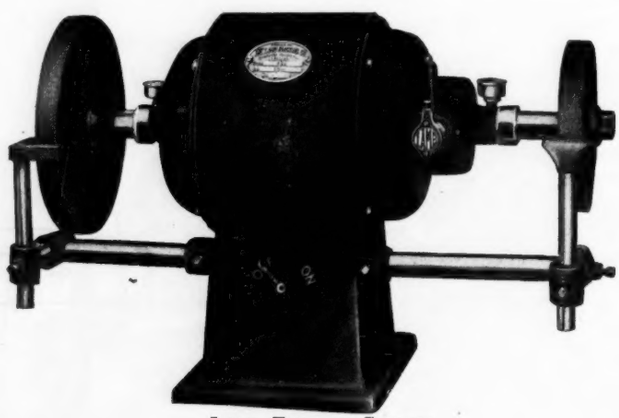


FIG. 2—DRILL SHARPENING ATTACHMENT FOR TRACK DRILL.

To accompany this drill a "track tool grinder" has been designed and as shown in Fig. 2 is so made as to be attached to the drill frame simply by the removal of one of the operating cranks. This grinder can then be revolved by means of the other crank and the train of gears shown in the illustration, at a high rate of speed. The convenience of this device not only shortens the time required for sharpening, but leaves little excuse for the waste of time that results from using a dull drill.

GRINDING AND BUFFING MOTORS.

The Lamb Electric Co., Grand Rapids, Mich., is now manufacturing a new direct current buffing and grinding motor, shown in the accompanying illustration, in sizes ¼ horsepower to 5 horsepower and is engaged with the design of both larger and smaller sizes of this machine and also with a motor for alternating current work. The buffing and grinding wheels are mounted on the armature shaft extended, one either side of the motor. A tool rest is carried out on an arm from the stand on which the motor rests. This cast iron stand is designed either for a bench motor or for standing on the floor and contains within, the starting box and cut-outs. The motor is entirely enclosed in a dustproof casing which when removed permits ready access to the parts of the motor. The motors are built, unless otherwise ordered, to operate on a 110 or 220-volt line. In weight and speed the machines now being manufactured vary from 65 pounds for the smallest, running 2,800 revolutions per minute to 310 pounds for the largest running 1,500 revolutions per minute.



LAMB ELECTRIC GRINDER.

The new plant of the Tool Steel Motor Gear & Pinion Co. at Carthage, O., is now in operation. The plant is turning out a specially processed and hardened steel gear wheel, designed especially for street car motors. The officers of the company are: President, David L. Carpenter, of D. L. Carpenter & Co., carriage hardware; vice president, E. E. Williamson.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS

Annual Meeting in New York—Foundry Practice, Superheated Steam, and Other Subjects Discussed—Volumetric Theory of Cast Iron Declared Worthless

The first general gathering of the American Society of Mechanical Engineers held in the new home of that organization in the Engineering Societies Building, New York, Dec. 3-6, attracted a larger number of members and visitors than were ever in attendance at any of the preceding 55 meetings of this technical body. To be exact, 727 members were enrolled and 605 guests. This meeting was also notable for many other reasons.

For the first time topics were considered in groups, no scattered papers having been presented, and the vigorous and animated discussions of gas power, foundry practice and superheated steam, stamps the venture a success. Another precedent was established by the holding of two sessions during the same morning and hereafter the meetings of several sections will be held concurrently.

The discussion of foundry practice attracted a large number of foundrymen and it is probable that this branch of the industry will be more carefully considered at future meetings.

The superheated steam problem was productive of such extensive discussion that the appointment of a committee was recommended to the research department for co-operation with the many individual investigators of this question and the co-ordination of their experiments. The extensive discussion given to the problem of gas power generation and application resulted in the formation of a temporary organization with the idea of launching a division of the society to be devoted exclusively to this work. The ample facilities of the building for concurrent meetings was demonstrated Thursday morning when sessions were held in the main auditorium and in one of the lecture rooms, both being provided with lanterns for illustrated papers. A pressing invitation for the next semi-annual meeting was received from Detroit.

Annual Business Meeting.

The annual business meeting preceded the regular professional session Wednesday morning. The report of the committee appointed to raise funds to pay the society's share of the cost of the land upon which the Engineering Society's building is erected, showed that only 7 per cent of the members have responded, and the total amount subscribed, including contributions from those not affiliated with the organization, is less than $75,000. An appeal was made for subscriptions from the members, and it was shown that a very small amount from each would soon wipe out the indebtedness. It was further decided to publish the names of the contributors but not the amounts. The appointment of a delegate to represent the society at a congress of refrigerating engineers, to be held in Paris next year was referred to the council.

Utilization of Low Grade Fuels.

"The Rational Utilization of Low Grade Fuels in Gas Producers" was the subject of an interesting paper presented by F. E. Junge, of Berlin. The ensuing discussion was widespread and many facts concerning fuel wastage in the United States were presented. Mr. Junge's paper briefly described modern methods of utilizing inferior grades of coal and their by-products which have been developed and applied in Germany. The author directed attention to the large profits that could be derived from the proper utilization of culm, coal dust, etc., which accumulates at mines and coking plants and is now generally wasted. The treatise was an elaboration of Mr. Junge's former paper on "The Evolution of Gas Power," presented at the last annual meeting, December, 1906.

The discussion was opened by W. B. Chapman, who pointed out the lines of advancement in Germany, where the low grade fuels are carefully conserved regardless of their fineness, percentage of ash and moisture. Coal containing 65 per cent of ash is successfully used in Germany in gas production, the high ash content facilitating gasification, while the abnormal moisture has a tendency to retard the formation of clinkers. The speaker also stated that all low grade fuels can be economically gasified in central stations where the by-products can be recovered, but to accomplish this successfully he contended that a gas producer must be developed that can be adapted to the use of low grade fuels. The successful solution of this problem is dependent upon the development of the suction producer for bituminous fuel, anthracite being used almost exclusively at present. The design of a plant that would operate almost automatically was recommended.

Dr. J. A. Holmes referred to the investigations that are being conducted by the United States Geological Survey, to ascertain by comparison the relative value of fuels. By the present method of mining both anthracite and bituminous coal, only a small percentage of the vein is taken from the ground, the average mined being not over 50 per cent in this country. In one exaggerated instance only 4 feet of a 25-foot vein were removed, that left underground containing only 5 per cent of ash. He said that it was practical to utilize the low grade fuels by locating gas producer plants at the mines, and directed attention to the tremendous consumption of coal in the United States, the total of each decade exceeding that of all preceding decades. The production during the period extending from 1895 to 1905 was equal to that of the preceding 75 years. The surface coal lands have been largely depleted, and the mines are being sunk to lower levels each year, thereby greatly increasing the production costs. He also referred to the rapid increase in the value of coking coal lands which are now held at from $1,500 to $2,000 an acre in Pennsylvania and West Virginia. Owing to the tremendous waste, President Roosevelt recently called attention to the necessity of conserving the fuel resources of the country, and Dr. Holmes added that 50 per cent of the output of the zinc and lead mines of the country is left on the ground. The president recently recommended the establishment of a bureau of mining and engineering and proposes to place it under the supervision of the various engineering bodies and under the control of the heads of the proper government departments.

Disadvantages of the Gas Producer.

The difficulties encountered in the gasification of low grade fuels in producer plants as at present designed were pointed out by Prof. C. E. Lucke. While the producer offers a better opportunity for the use of low grade fuel than the boiler, nevertheless to make the operation a commercial success the first cost of the plant must

be reduced as well as the labor cost connected with its operation. Prof. Lucke referred to the difficulties that beset all efforts to render the operation continuous. The first cost of the plant is greater than that of a steam boiler installation and the cost of firing a fuel not considered low grade at one plant was three and one-half times as much as ordinary anthracite under a boiler. Furthermore a number of spare producers must be provided to prevent the closing down of the plant, if the operation is to be rendered continuous. Prof. William Kent agreed with Prof. Lucke and declared that the utilization of low grade fuels was scarcely a commercial proposition at the present time, and believed that the low cost of installing the steam plant has postponed the day of the gas producer.

Apprentice System of the New York Central Lines.

W. B. Russell described the comprehensive apprentice system adopted by the New York Central Lines which includes special shop instruction carried on in the shops of this road, when the boy is under actual shop conditions, shop discipline and shop environment. Combined with this training, educational classes are held during working hours, using courses of study, intensely practical in character and outlined to illustrate, explain and supplement the work in the shop by simple and direct methods, suited to the needs of the apprentice. The scheme starts at the bottom and is designed to increase the efficiency of the rank and file of mechanics. It is expected that exceptionally bright boys will profit most by the training offered and thus provide the necessary leaders. This plan is directed toward a broad and well constructed foundation of intelligent, thoughtful shop workers. The genius is left to reveal himself. The plan is now working, and working well, under a central leadership and providing for widely varying conditions in nine different places. It may not be, and probably is not, perfect, but it has proved capable of meeting a specific need with great promise for the future. It seems equally well adapted to small as well as large organizations, is applicable to almost any branch of manufacturing or repair work, and can be installed in most shops with talent already employed.

This paper was discussed at length and many practical suggestions were made by those who have planned comprehensive apprenticeship systems. Henry L. Gantt said that more good work resulted from shop training than could be had in any other way. Description and instruction cards, he found, were extremely helpful to the instructors. The important point aimed at in industrial education is to train the shop employes to do as they are directed. Another speaker said that American shops are suffering from specialization. Furthermore, any system that failed to take cognizance of the man and his ambition was not a success. All efforts in the past have been directed toward increasing his earning capacity instead of his moral and mechanical improvement.

Prof. Arthur L. Williston, of the Pratt Institute, commended the system described by Mr. Russell, but added that all methods of training presented to the society in the past have differed widely, owing to the peculiarities of local conditions. A point in favor of the system under discussion is the opportunity presented of training the men under actual shop conditions. The men are also able to use the company's time for education and the length of the course, four years, is favorable to proper instructions when compared with the efforts that are made to crowd it in much shorter periods. Replying to the discussion Mr. Russell said that the plan was by no means philanthropic, but was adapted to produce better workmen. It has been installed in all shops on the New York Central employing five or more apprentices. In many of the shops clubs have been organized, one having recently purchased a piano and another a stereopticon. In closing he stated that any plan is doomed to failure that does not take into account actual industrial and economic conditions.

The presentation of the remaining papers on the morning's program was deferred until Thursday morning, when the discussion of the utilization of low grade fuels would also be resumed.

Color Photography.

On Wednesday evening, F. E. Ives, honorary member and past president of the New York Camera Club, assisted by A. R. Stieglitz, author and editor of the photographic works, delivered a highly interesting and entertaining lecture on color photography in the main auditorium, which detailed completely the progress of the art to date. The lecture was illustrated by stereopticon views.

Rapid Increase of Gas Producer Plants.

Reverting to the discussion of the utilization of low grade fuels and the gas producer on Thursday morning, Prof. Robt. H. Fernald, who was in charge of the gas producer division of the United States Geological Survey fuel testing plant, showed that during the past 12 months the number of gas producer plants in the country increased from 150 to 400, and of this number 15 per cent are operated on bituminous coal and 85 per cent on anthracite. The total horsepower is estimated at approximately 130,000, of which about 70 per cent is bituminous and the remainder anthracite plants. The average bituminous unit is of 1,600 horsepower as compared with only 100 horsepower for anthracite. This indicates that the larger plants have adopted bituminous coal and the smaller ones are operating more successfully on anthracite. Referring to the relative first cost of the producer and steam plant, from reports received by the government, it was found that gas plants of less than 1,000 horsepower cost from 15 to 30 per cent more than the corresponding steam plant, but the difference was made up by the producer installation within two years as a result of more economical operation. The cost of plants of from 1,000 to 5,000 horsepower was from 5 to 15 per cent greater than that of the corresponding steam plant and from 5,000 horsepower upward, the cost of the two installations was found to be nearly alike, the producer entailing an investment of $73 per horsepower as compared with $74 for the steam plant. By means of charts thrown on a screen the relative economies of gas and steam power plants were shown. The steam plants showed an average thermal efficiency of 10.3 per cent as compared with 21.5 per cent for the producers. The ash content of the coal fired in the producers ranged from 19 to 43 per cent, with a coal consumption of 1.65 pounds per brake horsepower.

Edward J. Kunze contended that the cost of attendance for a large producer plant was greater than that of a correspondingly large steam plant. He also found that the herring-bone grate was not adapted to low grade fuels owing to its tendency toward clinker formation. The inclined grate he also considered impractical and as the best results had been obtained by agitating the fuel bed slightly he suggested the use of the chain grate equipped with oscillating bars. It was

admitted that the steam plant permitted a much greater overload than the gas installation, which latter at the maximum averaged about 15 per cent. The gas engine was recommended for steady loads and steam power for fluctuating loads. Referring to the peculiar action of anthracite and bituminous coal when used for gasification it was stated that certain forms of carbon gasify more rapidly than others. It was found that charcoal gasifies rapidly whereas lamp black requires a much longer time. In reply to a question regarding the cost of maintaining a producer plant it was stated that the expenditures per annum of a $60,000 plant for several years only averaged $147.

J. R. Bibbins presented a report of a duty test on a gas power plant which is given herewith in abstract:

The test reported represents an effort to throw some light upon the question of the general character of service and average operating efficiency attainable from a modern bituminous producer gas power plant, and whether the high efficiency claimed for it is maintained in commercial service. It is treated from the practical, rather than the scientific standpoint, although the methods employed were as accurate as possible in a field test.

Control of Internal Combustion in Gas Engines.

Prof. Charles Edward Lucke, Columbia University, presented a highly interesting paper entitled "Control of Internal Combustion in Gas Engines." He pointed out that gas engine indicator cards for apparently identical settings of the valve gear and governor or for constant load, indicate variations where there ought to be constancy and where constancy is attained in steam engines.

Three possible causes for these variations are examined in the paper under the headings of mixture variations, explosive waves and pre-ignitions. Mixture variations are examined and the conclusion drawn that there seems to be little chance of securing absolute constancy with the present method of working. The explosive wave is examined in the light of the work of Mallard and LeChatellier, but is shown to be avoidable in some cases by giving proper form to the combustion chamber. Pre-ignitions of the sort that come and go, especially on producer gas, are analyzed in the light of some new work on the temperatures of ignition and it is shown that the percentage of hydrogen in the mixture does not determine the tendency to pre-ignite, but rather the ratio of carbon monoxide to oxygen or hydrogen to oxygen. It is also shown that when pre-ignitions occur they cannot be charged to combustion alone, but are due to insufficient cooling of some part and are to be avoided by proportioning the fuel elements to the oxygen in the mixture, and by more uniform and better cooling of the interior parts of the engine.

"The Evolution of the Internal Combustion Engine" was discussed by Prof. Sidney A. Reeve, of Harvard University. He laid emphasis upon the fact that the demand which guides this evolution is not one for futher refinement of efficiency, but for greater mechanical reliability and adaptability. In these directions the steam-engine sets a standard far ahead of the gas engine. With this in mind the author reviews, first, the possibilities for further development of the explosive type of engine. These possibilities comprise the design of a variable clearance Otto-cycle machine, and also the development of a high-pressure Lenoir-cycle engine. Both of these are broad types, capable of many modifications and adaptations to different services. Secondly, the attention is turned to the field of continuous combustion under constant pressure, and the development of a Joule-cycle machine which should follow closely steam engine lines of construction. The author closes with the belief that the gas engine of the future, although possibly performing its combustion explosively, is to be less like the gas engine of today than like the steam engine of today.

Owing to the lateness of the hour the discussion of these papers was limited.

Co-Operation in the Foundry.

The session of Thursday morning was held in two sections, one of the commodious lecture rooms on an upper floor being well filled by those interested in foundry practice. Discussion on all the papers presented was widespread and vigorous. In the absence of W. A. Bole of Pittsburg, his paper on "The Foundry Department and the Department of Engineering Design" was read in abstract by Secretary Rice. By a number of specific examples this paper illustrated the independence that must be acknowledged between the drafting room and foundry if suitable castings are to be produced. It emphasized the necessity of the designer combining his theory and data with a practical knowledge of the powers and limitations of the foundry, and pointed out that it is equally essential for the foundryman to know the intended uses of his product, in order particularly to make intelligent application of special treatment in pouring and cooling. The paper cited a number of cases of failure due to unsuitable design or to unsuitable foundry process and suggested modes of treatment for certain special cases.

The discussion was largely concerned with the size of fillet, several speakers citing instances where weakness had resulted from too great a body of metal. Mr. Kleinhans stated that better steel castings are secured by increasing the size of fillets up to the point where piping sets in. Another speaker told of an investigation of a fly wheel explosion, where an extra heavy fillet had resulted in shrinkage of iron into the rim, causing a large pocket at the point of juncture. The same experience in similar instances led to the cutting down of the mass of metal, thus removing the difficulty. In the manufacture of pumps the use of a heavy fillet frequently led to the dead partition in the center being extremely porous and eating through in a short time. This was avoided by casting a 1-inch head with a grillage of 1-inch bars, the resulting casting lasting four or five times as long as one with the heavier head.

Mr. Johnson told of a pulley of 3-foot diameter, 2-inch rim, which, when turned down rather thin, showed plainly seams of spongy metal on each of the six arms. Occasionally in chill castings a diagonal line can be traced from the bottom of the chill up and in cases of extreme crystallization a pin can sometimes be inserted in the openings. Mr. Williams told of putting on a riser to overcome the shrinkage difficulty in the casting of gear wheels. Mr. Lane said that, where a fillet is absolutely necessary, a chill can sometimes be applied at this point with good results. In cast iron or steel, he said, the skin is not so flexible; it sets first and later shrinkage is to the skin and not toward the core, though the reverse is true with many alloys. The importance of keeping sections of large castings even and of uniform thickness, so that metal will not be drawn from the heavier sections in cooling, was emphasized by several entering into the discussion.

Mixing Molding Sand.

In the absence of the author, Secretary Rice also presented by abstract the paper of A. E. Outerbridge Jr. of

Philadelphia on "Molding Sand." This described a number of original investigations in testing and mixing molding sand, and the effect of simple mechanical treatment in securing increased toughness and porosity. One passage through a centrifugal mixing machine, it was stated, gave a 75 per cent increase in toughness.

In discussing this paper, E. H. Mumford told of two classes of treatment; either putting the sand through a reciprocating riddle or turning it over with a shovel, and the rubbing of the alumina of the sand into the individual grains of silex. With the former, the effect is noted that, varying with the speed, the tendency is, because of the particles all rolling in one direction, to cause the alumina to gather in small nodules. The crystals become bare and the sand thus loses its bond. Good results, the speaker said, are secured from the centrifugal mill by the impact or "throwing together" method.

Speaking of core sand, a member referred to a case where a foundryman installed a clay grinding mill for the grinding of his core sand. He is able to re-use about 90 per cent of his old core sand and finds he can reduce his dry core compound by 50 per cent. Instead of bond sand, he uses ordinary bank sand and secures cores which are extremely regular, burn evenly and come out well. He is also securing heavy economies, having paid for the cost of installing the machine by the savings of eight or 10 months. The speaker further stated that this course is impractical for cores of less than two inches diameter. For 1-inch cores linseed oil and sharp sand are employed and for very fine cores an expensive liquid compound is utilized. The grinding mill is employed only for the larger sizes. By grinding the sand thoroughly, continued the same speaker, "they get it on the corner of the crystals." The decreased amount of bond required renders the core extremely porous.

Power Service in the Foundry.

A paper on this subject, read in abstract by A. D. Williams of Pittsburg, called attention to unusual possibilities in the line of power service for obtaining maximum production, and suggested a number of openings for important improvements, one of the most important being the giving of greater consideration to the crane service of the foundry.

A lengthy discussion was provoked by a contribution of Mr. Richards, challenging certain statements of Mr. Williams in regard to the efficiency of compressed air in its ease of distribution through pipes. He recited details of its successful use in connection with the building of the Pennsylvania tunnels and stated that at the Phillipsburg plant of the company he represents all power is transmitted either by electricity or compressed air. At the Amherst quarries of the Cleveland Stone Co., he declared, there are nine or 10 miles of compressed air pipes and pressure is maintained over night without difficulty. In the New York tunnel work there have been employed 80 air compressors, with a combined capacity of 190,000 cubic feet per minute; they have been at work constantly night and day, Sundays included, and have set new speed records.

Mr. Mumford, though stating that he was not criticising compressed air or the air compressor, commented upon the fact that the leak in one of these pipes is a subtle one, hard to locate, and that leaky valves are able to prove a source of trouble. Another speaker said that because of lower pressures and the absence of expansion and contraction leaks are not so common as with water or steam pipes. Mr. Johnson told of a 5-inch compressed air line 8,000 feet long at his plant, which gave practically no trouble; it is equipped with long sleeve couplings and expansion joints. He thought the chances of keeping the steam or air line tight and in good shape were 10 to 1 in favor of air. Mr. Ronceray spoke of the availability of water pressure to molding machine work. Mr. Lane told of steam pipe lines in mining regions giving constant trouble, while long air lines held their pressure well, even over holidays. He emphasizes the necessity of having the pipe line cared for by a competent engineer, a point which he said was commonly overlooked in the foundry.

Foundry for Bench Work.

This paper, the joint production of W. J. Keep and Emmet Dwyer, was presented in abstract form by the latter. It described the new steel and glass foundry of the Michigan Stove Co. and was not discussed at length.

A Volumetric Study of Cast Iron.

The concluding paper presented at this session, a discussion on the above subject by Henry M. Lane of Cleveland, was illustrated by a number of lantern slides, which were explained by the author. The usefulness of a number of charts shown was largely destroyed by errors in drawing, resulting in the proportions of impurities to the volume of iron not being correctly maintained. The paper dealt with the author's discoveries regarding the volume occupied by impurities in cast iron, dealt also with malleable castings and compared gray iron castings with wrought iron.

The ensuing discussion brought out a very general disinclination to accept the theories set forth by Mr. Lane. Mr. Johnson, the first speaker, said that both in theory and practice the paper was absolutely in error so far as malleable castings were concerned. Carbon can penetrate through iron, he continued. The only part of the malleable casting which is worth anything is the outside skin, which is decarbonized. The casting otherwise might almost as well be hollow, except for the opposition offered to collapse. Volumetric study, he concluded, was without basis, except so far as it concerned graphitic carbon in cast iron.

Mr. Lane was questioned in regard to the nature of the pickling bath in which several small castings entering largely into his discussion had remained a number of months. He said it was very dilute hydrochloric acid, about a 1 per cent bath. Mr. Keep said this acid was used to take the silicon off the casting. A sulphuric acid bath is also employed, but in time hydrochloric acid will disintegrate iron. Mr. Outerbridge offered a written discussion, describing the action of the weak acids in the bilge water from the hold of freight steamer in producing an effect on a cast iron strainer similar to that described by Mr. Lane, and cited another case where oil refiners' acids had so changed the character of a cast iron pipe that picks penetrated it without difficulty.

Prof. Stoughton said that Mr. Lane's theory was interesting, whether correct or not. It would hold, in his opinion, for graphitic carbon, but not for the other elements because they are in a combined state. Graphitic carbon does occupy space and therefore is of interest. He told of the theory advanced by Sir William Austen dealing with the molecular volume of impurities and stated that this bore many points of resemblance to that offered by Mr. Lane. The former was put forth many years ago. Prof. Stoughton also took issue with the author of the paper over the statement made in its presentation that the microscope was of little value to the foundryman. It has already helped the foundryman greatly, he declared, and can be of as much or even more assistance in the foundry as in steel

works, all of which, provided they are of any considerable size, are now equipped with a complete microscopic department. The problem of the iron foundryman is much more complex than that of the steel founder and therefore the microscope can properly be applied and will prove of much importance. He cited the case of a concern operating a number of gray iron foundries having taken up within a year the microscopic study of cast iron. Prof. Stoughton stated that at the afternoon session he hoped to be able to present a number of lantern slides in proof of his contention. Another speaker, in closing the discussion for the morning, said that Mr. Lane had given a few facts, but that the further value of his paper was entirely negatived by his failure to take into consideration the fact of the elements combining.

Thursday Afternoon.

The discussion of foundry practice was continued in the main auditorium on Thursday afternoon. In refutation of the statement made by Mr. Lane at the morning session that the microscope is of little value to the foundryman, Prof. Bradley Stoughton supported his contention that the contrary is true with a large number of lantern slide illustrations of micrographs of different grades of iron as well as steel.

Owing to the absence of Dr. Richard Moldenke, the secretary read an abstract of his paper on "Specifications for Iron and Fuel, and Method of Testing Foundry Output," which was published in the Dec. 5 issue of THE IRON TRADE REVIEW.

Cupola Practice.

The paper prepared by W. J. Keep on "The Foundry Cupola and Iron Mixtures" aroused considerable discussion. The author related some of his foundry experiences and his endeavors to aid the founder in the more economical operation of his plant. He pointed out that the successful operation of the cupola is due more to the skill of the operator than to the proportion of the furnace. Regarding mixtures it seems difficult for the founder to understand the relation between chemical and physical composition and the effect of slow and rapid cooling. One method of calculating mixtures to secure various qualities of castings was also given and the regulation of the percentage of silicon by mechanical analysis was described.

A written discussion prepared by W. R. Brandon was read by the secretary, in which Mr. Brandon took issue with Mr. Keep regarding his statements anent cupola linings. In reply Mr. Keep said that cupolas are much alike and he selected the one described owing to the good work it has accomplished. In reply to a question regarding the use of borings, he said they can be used to good advantage to close up the grain of the iron. These should be charged in wooden boxes, and it is obvious that these will not be totally destroyed until the melting point is reached. The strength of a test bar, Mr. Keep said, was in proportion to its size and its strength is increased 25 per cent by tumbling and suggested that it would be advisable for all foundrymen to tumble their castings to increase their strength.

Foundry Blower Practice.

An able discussion of "Foundry Blower Practice," given in full on another page of this issue, was presented by W. B. Snow.

In discussion several alleged errors in the tables presented by Mr. Snow were pointed out, but these were undoubtedly due to the method of calculation. It was suggested that if some proper method were evolved for testing blowers it would not be difficult to arrange a standard for blower practice.

E. H. Berry presented the following abstract of a paper on "Patterns for Repetition Work":

"A distinction exists, based on output, between repetition and jobbing work. In the former, slightly cheaper production justifies considerable expenditure in design and constructing.

"Pattern drawings are essential. Also co-operation between the drafting room and other departments. Drawings should show actual pattern dimensions, required accuracy, draft, parting and carding.

"Standard flask sizes are desirable. Limits are given for one-man molds. Plate patterns—ordinary, 'reversible' or 'split'—as preferred. Complicated partings compel 'open' carding. Details discussed are: Height and spacing of mold board cleats; unnecessary rounds and fillets; draft; dimensioning draft; runner sections; connection details; materials.

"Accuracy is unnecessary where finish is allowed, but is essential at other specified points. Economical construction methods are outlined, and working instructions quoted. Excessive pattern duplication should be avoided. Precautions on new work are suggested. Carding different patterns is altogether undesirable. Important construction details are accuracy of rounds and fillets, and fitting of flask pins to gage."

Limitations of Molding Machines.

Attention was directed to "Some Limitations of Molding Machines" by E. H. Mumford, who stated that many of the limitations known to the present American machines are eliminated in the French machines which are now being introduced in this country, and which are fully described in Mr. Mumford's paper. He added that the French machine promises to carry the art of power machine molding in this country farther than it has ever been carried before. Mr. E. Ronceray, Paris, inventor of the French process of machine molding, briefly described the various devices now in use whereby the most intricate molds can be successfully made by machine.

A recommendation to standardize foundry equipment, with specific reference to flasks, was referred to the council of the society.

Reception.

The only distinctive social feature of the meeting was the largely attended reception in the Engineering Societies building on Thursday evening. The president and president-elect received the members and guests in the auditorium and the reception was followed by dancing on the fifth floor of the building, which was continued throughout the evening. Supper was served from 10 until 12 o'clock.

The Superheated Steam Problem.

At the concluding session, Friday morning, two important papers were presented touching on different phases of the superheated steam problem. These were productive of such extensive discussion that the appointment of a committee of the society was recommended to the research department for co-operation with the many individual investigators of this question and the co-ordination of their experiments.

Prof. C. C. Thomas, of Ithaca, N. Y., in person presented a synopsis of his important contribution, a treatise on "The Specific Heat of Superheated Steam." This gave in graphic form the results of an extensive series of experiments made in such manner that the accuracy of the work is established. The work extended over three years of continuous research, and the various series of experiments were so planned that they check each other, and this serves to verify the accuracy of the results. The method used included heating the steam by means of the electric current. The

development and final form of apparatus were fully described, as were the methods of making observations. The results were given in such form as to afford means of comparing them with results obtained by various other experimentors in the same line. A Mollier heat-diagram, prepared by the author and included with the paper, gave the results of the investigation in convenient form for immediate use by engineers.

The discussion ensuing emphasized the difficulty of securing reliable results for extremely high pressures, though admitting the acceptability of Prof. Thomas's results for pressures ranging from 100 to 200 pounds per square inch. A paper on "Engine Design Adapted for the Use of Superheated Steam" was then presented by Max E. R. Toltz, of St. Paul, Minn.

Superheated Steam Engine Design.

In connection with several drawings illustrating a German engine designed for the use of superheated steam and drawings of cylinder and valve details, this paper presented a number of recommendations based on the experience of the writer. The advantages of the use of superheated steam he enumerated under three headings:

a. It eliminates almost all cylinder condensation. b. Its volume increases and the clearances in the cylinder are therefore reduced. c. The degree of efficiency of the "Carnot's" process in the engine is raised.

Superheated steam of 575 degrees Fahr. should be used. On account of the large wearing surface, which is difficult to lubricate, the Corliss valve can generally take steam having a temperature of only 475 degrees Fahr. This is not high enough to get economy.

Double seated poppet valves for small engines with low piston speed and four seated poppet valves for large engines with high piston speed to be used for highly superheated steam. Piston valves can also be recommended. It is advantageous to locate the poppet valves in the cylinder heads which makes a plain cylinder. No steam jacket is necessary for the high pressure cylinder. The material of the cylinders should be distributed uniformly to prevent warping, due to high temperatures. The tandem type of engine was recommended on account of its being able to use high piston speed, which reduces first cost. Latest types of poppet valve engines in Europe have 230 to 240 revolutions per minute. Valve casings cast on cylinders should have no steam channels cast on. The piston should have three rings of good width. For horizontal engines it should be guided by a bearing of the extended piston rod. The piston should be lubricated directly and the piston rod packing should be metallic. The cut-off can be reduced but cylinder dimensions should then be enlarged. At velocities from 40 per cent to 60 per cent greater than that of saturated steam, superheated steam will not show a throttling line of expansion on the indicator diagram.

In the course of the discussion on this paper one speaker suggested that the design of an engine for the use of superheated steam should be along lines very similar to those of the gas engine. Mr. Emerson brought up the well known fact of huge discrepancies in results shown by locomotives on test runs and in actual service and stated that in the former almost any desired results could be obtained, the only limit being the willingness of the railroad management to accept them. Mr. Crocker advocated a lower degree of superheat, fixing 500 degrees Fahr. as the serviceable limit and declaring that the attempt to extend this limit has had much to do with retarding the general adoption of this type of engine. Mr. Seymour classified the economies secured by the use of superheated steam under two headings; the increase in the range of temperature limits and the physical effect, as illustrated by decreased heat transference. Commercial economy, he declared, was reduced by attempting to use very highly superheated steam.

Among the difficulties incidental to its use, as pointed out by other speakers, were the lack of condensing facilities on engines not originally planned for superheaters and the inability to secure tight joints after repairs have been made. The question of lubrication was also brought up, one speaker recommending the use of filtered fluid oil, with a flash limit of 350 to 400 degrees, and another stating that cylinder lubrication is more satisfactory with a moderate degree of superheat. In concluding the discussion Mr. Toltz declared that from actual service sheets of locomotives an increase is economy of from 15 to 18 per cent can be shown by the use of superheated steam, while by its installation in any boiler plant an economy increase of 8 to 10 per cent can be secured.

The Friction Drive.

An interesting paper by Prof. W. F. M. Goss, of the University of Illinois, was presented by Mr. Pomeroy, who read an extensive abstract, the main points of which are given below:

A friction drive, as the term is here employed, consists of a fibrous or somewhat yielding driving wheel working in rolling contact with a metallic driven wheel. The power which may be transmitted by such a drive is a function of the pressure of contact which may be maintained between the wheels and of the co-efficient of friction which is developed in consequence of this pressure. A method of experimentation, designed to disclose numerical values for these factors was described, and facts concerning the pressure resisting and frictional qualities of fibrous wheels composed of such materials as straw fiber, leather, leather fiber, and sulphite fiber, as determined by experiments, were set forth. Formulae based upon these data, which may be employed for calculating the power that can be transmitted by such fibrous wheels when employed to drive wheels of iron, aluminum, and type metal, were also developed. Tables and diagrams based upon these formulae constitute a summary of results in convenient form for use.

There was no discussion on this paper, owing to the lateness of the hour, and the session was concluded with the presentation by Prof. Jacob H. Wallace, of the University of Colorado, of a paper on "Cylinder Port Velocities," abstracted as follows:

The velocity of flow through the port of a steam engine depends upon the port opening and the piston velocity. For a constant velocity of flow during a stroke the port opening must be proportional to the piston velocity. If the piston velocity be applied graphically to represent port opening as in a Bilgram valve diagram a steam lap curve for a constant velocity of flow will be established. A valve gear to afford that velocity of flow must provide the same port opening for the same crank position. A set of curves may be obtained by establishing other constant velocity curves by means of which the velocity for any crank position may be determined.

At a brief business session immediately following, the thanks of the society were voted to those who had made possible excursion trips for the members and to the others aiding in making the meeting a success. Greetings were received from other scientific organizations and President Hutton turned over the gavel to his successor, M. L. Holman, by whom the meeting was adjourned.

Gas Power Organization.

The extensive discussion given to various topics incidental to the wide problem of gas power generation and application resulted in an informal meeting, after the close of the regular meeting Friday, of some 40 members particularly interested in the subject and in the formation of a temporary organization with the idea of launching a division of the society to be devoted exclusively to this work. Among those prominent in the discussion were Albert A. Cary, F. W. Stillman, Robert H. Fernald, L. B. Lent, Henry H. Suplee and Chas. E. Lucke. Prof. Lucke, who presided, stated that there were probably 100 well informed men in this conutry experimenting with gas producers and a much larger number working with gas engines. He made a plea for the holding of frequent meetings, at which there should be a free interchange of experiences and ideas with the aim of fostering and advancing the progress of gas as power. Dr. Lucke was made temporary chairman and Henry H. Suplee, temporary secretary, the latter being delegated to lay the project before the council of the society and request permission for the formal organization of a gas power division. The plan is to make this thoroughly scientific, eliminating the commercial element, and to hold meetings as frequently as once a month, provision being made for the publication of all papers of general interest.

Excursion Features.

Several hundred members and guests of the society on Wednesday afternoon availed themselves of the invitation of Charles M. Jacobs, chief engineer of the Hudson companies, to inspect the tunnel now nearing completion between Hoboken, N. J., and Christopher street, New York. Two inspection parties were organized, one proceeding only as far as the caisson and the other walking the entire two miles beneath the North river. A descriptive circular written by S. D. V. Burr and published by the society related the history of the tunneling operations under North river from the earliest attempts of D. C. Haskin, a third of a century ago down through the successful undertakings of the Hudson companies, and placards at various points in the tube pointed out various points of interest. The trip of two miles was made in about an hour.

Advantage of the invitation of F. H. Stillman, of the Watson-Stillman Co., was also taken by a large number to visit the works of that company at Aldene, N. J., where a 300-horsepower gas producer and engine had just been completed. This inspection was of particular interest in view of the wide prominence given the gas power problem throughout the sessions of the meeting. A number of small parties were also made up to visit the Pennsylvania cross-town tunnel, upon invitation of D. L. Hough, president of the United Engineering & Contracting Co., and the new plant of the McGraw Publishing Co., a unique office and manufacturing structure of reinforced concrete at 239 West 39th street, was open to members and guests during the week.

NO SUSPENSIONS

Of Industrial Plants in San Francisco —Building Less Active.

San Francisco, Dec. 1.—As far as known, not an industrial plant in San Francisco has suspended. The governor of California declared a holiday from day to day, to avoid a rush on any weak bank in the state. The suspension of the California Safe Deposit and Trust Co. caused a scare, and it was feared that a run would result. That bank invested a large amount of its funds in the Tesla Coal Co., and could not realize. One little mushroom bank in this city also suspended. To avert a possible panic or even a scare through the suspension of a few more of such concerns, started since the fire by men without experience, the holidays proved effective. The big banks had enough money to supply all legitimate demands, and they did not take advantage of the legal holidays. Californians took the clearing house certificates reluctantly, because they are accustomed to handling coin, and have an aversion for paper money. Building operations diminished slightly, which may be attributed in part to the financial flurry. High wages, exorbitant prices for material, and the aversion of men to do honest work, may have had more to do with the lessening of building enterprises than the money stringency. Construction work in the interior, and especially in the mountain regions, has been curtailed, as it always is at this season, when the winter sets in, and the men flock to the city. One of the large department stores in Los Angeles failed recently, with liabilities reported at $500,000. The establishment was comparatively new and located in the new retail district of that city. Industrial plants in San Francisco and its suburbs are working with full force.

IMPROVED TONE

Is Noted in Manufacturing Business in Columbus.

(Special Correspondence.)

Columbus, O., Dec. 7.—Interviews with officials of the leading iron and steel industries of Columbus indicate that business is taking on a better tone and all say they have reason to hope that normal conditions will be resumed after the first of the year. Inquiries received in the last 10 days indicate that buyers will be in the market as usual next year.

The private bank that closed its doors was more of a brokerage office than a bank and the number of its depositors was very limited. Its suspension was due more to a disagreement between partners than to the financial disturbance. The banks of the city, to their credit, have met in cash, all payrolls, that are normally paid in cash, with the exception of the first week. This means that they have made up the payrolls for the Hocking Valley railway, and for the several large coal companies doing business in the Hocking Valley and having headquarters here.

Russell Kilbourne, of the Kilbourne & Jacobs Mfg. Co., says that inquiries have been coming in very fast in the last week and that a good bunch of orders is now in sight. The last 10 days, he said, has put a new face on business conditions and the outlook has been brightening steadily.

David Singleton, general manager of the Columbus Forge & Iron Co., reports that business is improving and he hopes to see it back to normal after the first of the year. The plant is still running with its short force, but the inquiries being received indicate that the orders will be coming in after Jan. 1. He does not expect material improvement this month, as buyers usually let their stock run down for the annual invoices which take place the last of the year and do not stock up again until the opening of the new year.

Secretary Miller, of the Jeffrey Mfg. Co., says that, while his company is still trimming in expenses wherever it can, he has reason to believe that a better feeling exists and that business will open up again after Jan. 1.

Officials of the Ralston Steel Car Co. and a number of other industries expressed views similar to those quoted. All feel sure that the worst of the depression is over and that business is on the rise again.

The Pennsylvania railroad is the first of the steam roads entering Columbus to signify its acceptance of the plans and terms of the city for

the elimination of grade crossings in the city. The plans contemplate overhead crossings constructed largely of steel. It is expected the other roads will sign the contracts with the city in the near future. The interurbans are not satisfied with the plans. They ask for an 18-foot instead of 16-foot clearance.

The Kilbourne-Jacobs Mfg. Co., Columbus, closed down practically all of its departments Dec. 1, for annual invoice and repairs, and resumed operation again the middle of this week. The present working force will not be materially increased until after the first of the year.

The Columbus Malleable Casting Co., which commenced business about three months ago, has completed its second furnace, but will not start it until business begins to pick up again. It has been operating with one furnace, turning out between 15 and 18 tons daily. With the new furnace, its daily capacity will be about 35 tons. A large part of the output of the company has been, up to this time, taken by the Ralston Steel Car Co.

NO IMPROVEMENT

In Industrial Conditions at Milwaukee, But More Cash in Use.

(Special Correspondence.)

Milwaukee, Wis., Dec. 5.—The Illinois Steel Co., a part of the United States Steel Corporation, which employs about 1,800 men in Milwaukee, has laid off about half its force. All of the merchant mills and the two blast furnaces have been closed down, leaving only the rail mill and the top-and-bottom mill in operation.

Conditions have not improved here. They are worse, if anything, for the reason that the financial disturbance has been actually felt here but a few weeks. Manufactories producing iron goods are the heaviest sufferers, and none of those that have closed departments have increased forces since.

One of the strongest indications of the situation is afforded by the local railroads. Foreign cars are being hurried off the lines with all possible dispatch, to avoid per diem charges, the most signifioant feature of this policy being the fact that the cars are being dispatched unloaded. Cars of lesser capacities are being switched to one side, and not repaired, while only the heavier cars are being repaired and kept in service. Switching crews are being laid off, and there has been a heavy reduction in freight. The local banks, however, appear to be in excellent condition, and considerably more cash is being passed out than has been the case at any time for a month preceding.

MORE FOUNDRY WORK

In the Chicago District—Strict Economy Is Still Necessary.

(Special Correspondence.)

Chicago, Dec. 7.—The industrial situation in the neighborhood of Chicago at present is stronger in one respect certainly than it has been any time in the past two months in that the various institutions have accommodated themselves pretty thoroughly by this time to the restricted conditions under which they must operate. The period of trying uncertainty as to whether obligations could be tided over may be said to have passed for the manufacturer. At the same time, the necessity for cutting expenses to a minimum, of ceasing nearly all new construction work and of operating with reduced labor crews is still in force at these plants where retrenchment has been necessary. The embarrassment resulting from these causes is no longer increasing in this district, however, and inquiry generally elicits a common sentiment to play safe on the present scale of operations until positive evidence of a buying demand with a financial condition to support it presents itself to give assurance of the ready absorption of increased or normal output. Actually this assurance for the immediate future is still lacking and there are but few instances of former conditions restored where reductions were made, but it is true that a returning tide of confidence has clearly manifested itself and is carrying with it rumors and plans for resumption that promise the not distant advent of that period. It is probable that a further curtailment in the production of semi-finished material both by the Steel Corporation and independent interests will be made at Chicago, but appearances point to a change for the better, if anything, in the activity of machine shops and foundries. The curtailment of merchant pig iron will probably reach 70 per cent of the total capacity in this district and the steel companies' production between 30 and 40 per cent. Output from mill has been affected in widely varying degree at the different plants, but, taking the entire period of depression, the bottom point of which apparently has been reached, it is not too much to say that outside of the Steel Corporation a reduction of from 50 to 60 per cent has been necessary. Machine shops are working about one-third below normal and foundry operations, at one time suspended to the extent of nearly 60 per cent, are now doing nearly 25 per cent better than that.

MORE CONFIDENCE

In Cincinnati, But Material Change Not Expected Soon.

(Special Correspondence.)

Cincinnati, Dec. 7.—Industrial conditions here this week have shown no material change so far as curtailment of forces or resumption of work is concerned, but there is a more confident feeling developing and collections have improved. Correspondence is more encouraging and indicates that after the first of the year there is likely to be order placing.

There are a number of machine tool plants that are still running full time and with full forces. Some have reduced working hours from 55 hours to 40 hours and some very large plants have reduced their forces from 25 per cent in some cases to 40 per cent in others. A few have made heavier reductions, but the figures given are fairly representative of the way the machinery and foundry interests have been affected by the depression. It appears that no further shrinkage in working forces is likely for the present, because most of the orders now on the books will be filled, as the cancellations have practically stopped. Some of the manufacturers are in strong position and say they are not afraid to make some stock under the belief that when business picks up prompt deliveries will be a selling point and they are welcoming an opportunity to get a little stock ahead.

European orders and orders from Mexico, Canada and the extreme west have been in evidence more than from the strictly domestic trade during the week, but still several concerns report the booking of some nice business this week.

Curtailment in working hours and forces is practically over and in view of the general conditions it is surprising the number of large plants that are continuing to run full time with full forces. The outlook and general attitude of the manufacturers in the whole machinery field here grows more optimistic with each week. The inquiries under consideration are regarded as indicative of actual wants and not merely shopping. In one instance figures were asked for on some certain sizes of machines by a railroad with a date set for reply. This was followed by a telegram correcting the date to a nearer period. In another instance an engine builder lost an order

upon which he was figuring, but upon finding that the order was actually placed, the circumstance was not so exasperating, as it furnished evidence of an actual intention to buy.

The King Machine Tool Co., is installing a new boiler, as additional power was needed to operate its increased equipment.

The Triumph Mfg. Co., is moving into its new building this week. The company has been occupying the third floor of the Cincinnati Machine Tool Co.'s plant and that company will now utilize the space vacated in its own business.

The foundrymen of Cincinnati and vicinity will hold a meeting this week to consider a report from their committee appointed to draw uniform form of contract applicable to the purchase of castings by the machine tool builders. It is believed that, when this uniform contract basis shall be brought to completion by conferences between the machine tool builders and the foundrymen, much of the friction between these two interests will be eliminated.

FEW SUSPENSIONS

Of Plants in Cleveland District—Financial Situation Better.

Cleveland has been moderately fortunate in the extent to which the present inactivity of business has affected the city's industrial prosperity. While curtailment of output has been exercised to a marked degree in common with other manufacturing centers, instances of complete suspensions of operations during the past month, in which the greatest force of depression has been felt, have been few and for short periods. Not more than 10 metal-working shops have been closed for various lengths of time during the period of trade inactivity, but these are now all operating, though not at full capacity.

Care has been taken by manufacturers to keep all employes upon their payrolls as far as possible and to save the latter from hardship and distress. Some shops are operating with a full force for three days a week, while others are alternating in working part of their force one week and the remainder during the following week.

It is estimated that the foundry output in this district is about 60 per cent of the normal capacity and that payrolls have been reduced to about one-half in metal-working institutions. The automobile industry, as is to be expected in times of business depression, has suffered considerably, but only one company, the Royal Motor Car Co., has been embarrassed in any way, and the appointment of a receiver for that company is said to be due entirely to the tight condition in available cash. The officers of the company declare that it is perfectly solvent. Operations in automobile shops are now being carried on at a very fair extent, even better than might be imagined in view of the prevailing commercial conditions.

Sentiment Has Improved.

Business sentiment in this district has gradually improved during the past several weeks as the stringency in money has been diminished. While a variety of opinions are expressed regarding the future, the consensus of belief is that a safe and sound resumption of business, founded upon a more conservative basis than in the past, may be expected in the early part of the incoming year.

Operations at the local plant of the American Ship Building Co. have been considerably reduced, and the work now being carried on is largely of the repair variety. More men have been added to the works force since the beginning of curtailment, however, and enough new business is at hand to maintain plant activity until next spring, while additional boat projects are expected to materialize with the relief of the financial stringency. The mills of the American Steel & Wire Co., in this city, are all operating, but the Emma and Newburg blast furnaces of the company are temporarily out of blast. The merchant stacks of the Cleveland Furnace Co. and the Upson Nut Co. are steadily operating although the latter is about to be blown out for several weeks for repairs. The weakness in the bar iron market has caused the closing at intervals of both the Empire and the Union rolling mills in this city, and the plant of the Cleveland Steel Co. is also idle, but it is stated that the latter will resume in a short time. The works of the Otis Steel Co. are operating at a comparatively high percentage of their capacity, and booked orders are such as to justify the maintenance of this condition for some time, it is stated.

LITTLE CHANGE AT ST. LOUIS.

(Special Correspondence.)

St. Louis, Dec. 7.—The industrial situation in St. Louis and East St. Louis, Ill., has practically undergone no change during the week. None of the plants that closed down on account of surplus products or money stringency has resumed operations, and no new ones have closed down. East St. Louis today promises some relief by offering to pay her employes' payroll and claim accounts in cash.

The money situation was discussed by the East St. Louis Commercial Club Thursday night, and conditions in East St. Louis were declared to be improving rapidly. The city is ready to take the lid off money matters as soon as the eastern cities set the example and promise to follow the lead, it was asserted by well-known bankers and business men.

L. C. Haynes, vice president of the East St. Louis and Suburban Railroad Co., asserted that less than 2,000 white laborers and mechanics were out of employment, but that several thousand Greeks and Armenians had been discharged.

SOME PLANTS RESUME,

But Permanent Operation Not Assured —Plate Mills on Half Time.

(Special Correspondence.)

Philadelphia, Dec. 7.—The industrial situation in this territory has shown few changes during the past week. Word comes from Goshen, Va., that the Victoria furnace of the Goshen Iron Co., the largest stack in Virginia, was blown out today for relining, and that it will not be put in blast again until matters have changed materially for the better. The recent curtailment of pig iron production in Pennsylvania by the closing of furnaces appears to have been radical enough to bring production and consumption very close together, and no further shutdowns are reported. Among the mills reduced forces or short time are still the rule. The Pencoyd works of the American Bridge Co. here are running five days a week, but at Coatesville the plate mills of the Worth and Lukens companies are making barely half time. After a week's suspension, the Alan Wood, Longmead, and other plants at Conshohocken are to resume next Monday, but this is not expected to be permanent. The Midvale Steel Co., which has large government contracts, does not appear as yet to have been affected by the prevailing depression. Many reductions in wages, generally averaging about 10 per cent, have been made.

Inmates of the Indiana reformatory at Jeffersonville have finished a new foundry at that institution. It is 320 x 138 feet and all of the work except the steel castings was done by convicts. The product of the foundry will be purchased by the Indiana Manufacturing Co., Peru, Ind.

Price Recovery Continues in Stocks

A continuation of the recovery of security prices is evidenced by a review of the past week's market conditions. The feeling is generally held that the favorable developments in the market, in a measure at least, reflect the better tone in general commercial affairs, although much of the recovery may be attributed to the manipulation of professional market operators. The bear party sustained a severe rout, and was forced to cover extensively. A rapid upward movement of the market is not expected by conservative operators, who hold to the belief that the recent improvement has been too rapid and that a reaction appears likely to manifest itself soon. Present financial conditions, it is thought, forbid an extensive bull campaign at this time. The upward swing of prices in the week amounted to a gain of about 3½ points in 20 active railroad stocks, making a rally of over nine points from the low figure of Nov. 21. Industrial securities show almost as favorable a record. Bonds have shared equally with stocks in the increased activity and higher prices, and this is regarded as an especially favorable development. Financially, the market's condition has not improved so rapidly as anticipated. The favorable changes were most marked in call loans, where there were increased offerings of funds and declines in the maximum rate. Time loans have remained largely nominal. The currency premium continued all week. After an early rise to 2 per cent, the premium dropped below 1 per cent, but later recovered. The foreign situation showed a marked betterment. An improved condition was revealed by the New York associated bank statement. An increase in cash of $4,671,100 and a decrease in the required reserve of $2,107,975 netted a reduction of $6,779,075 in the reserve deficit, bringing that figure down to $46,210,350, comparing with deficits of $6,702,175 in 1906, and $1,246,525 in 1905. A decrease in loans of $11,682,900 is regarded as the most favorable feature that has appeared since the beginning of the panic. The decrease in deposits was $8,431,900.

Copper Stocks.

Boston.—Butte Coalition, closed 15, net gain in week ⅛; Calumet & Arizona, closed 96½, net loss 2½; Calumet & Hecla Mining, closed 596, net gain 26; North Butte Mining, closed 40, net loss ½; Osceola Mining, closed 84, net gain 4; Quincy Mining, closed 78, net loss 1.

New York.—Amalgamated Copper, closed 48⅜, net loss 2⅝.

Recent dividend declarations include the following. American Car & Foundry Co., regular quarterly dividends of 1 per cent on the common stock and 1¾ per cent on the preferred stock, payable Jan. 1; American Pipe Mfg. Co., regular quarterly dividend of 2 per cent, payable Jan. 1; American Brake Shoe & Foundry Co., regular quarterly dividends of 1¾ per cent on the preferred stock and 1 per cent on the common stock, payable Dec. 31; Saco & Pettee Machine Co., regular semi-annual dividend of 3 per cent on its common and preferred stocks, and an extra dividend of 1 per cent on its common; Ingersoll-Rand Co., regular semi-annual dividend of 3 per cent on its preferred stock, payable Jan. 2; American Can Co., regular quarterly dividend of 1¼ per cent on the preferred stock, payable Jan. 2; Canadian General Electric Co., regular quarterly dividend of 2½ per cent.

The stockholders of the Westinghouse Air Brake Co. have voted to increase the capital stock of the company from $11,000,000 to $14,000,000, and have also declared a stock dividend of 25 per cent.

THE LEADING INDUSTRIAL SECURITIES.

	Clos'ng Quo Dec 7.	Changes in Week	Date 1908 Ann. M't'g	Stock Outstanding	Dividend		
					Basis	Last Declared	Date Last Div. Pay.
Allis-Chalmers	6¾	+1⅛	Sept. 6	19,820,000		.....	.....
Allis-Chalmers pr	16⅝	+1⅝		16,150,000	7 cum	1¾ Q.	Feb., 1904
American Can	4	+ ⅝	Feb. 1	41.233,300		.....	.....
Am. Can pr	40	+5		41,233,300	7 cum	1¾ Q.	Oct , 1907
Am. Car and Fdy	33⅛	+4⅝	June 28	30,000,000		1 Q.	Oct., 1907
Am. Car and Fdy pr	87½	+5		30,000,000	7 n. c.	1¾ Q.	Oct., 1907
American Loc	39	+2	Oct. 16	25,000,000	5	1¼ Q.	Nov.,1907
American Loc. pr	86½	+1½		25,000,000	7 cum	1¾ Q.	Oct., 1907
American Ship	45¼	+9	Oct. 10	7,600,000	4	3	Sept. 1907
American Ship pr	86	.....		7,900,000	7 n. c.	1¾ Q.	Oct., 1907
Am. Steel Foundries	5⅜	+ ⅜	Oct. 2	15,810,000		.....	.....
Am. Steel Foundries pr.	27	— ½		17,240,000	6 cum	2½	Aug.,1904
Barney & Smith	65	.....	June 5	2,000,000	4	1 Q.	Sept.,1907
Barney & Smith pr	128¼	.....		2,500,000	8 cum	2 Q.	Sept.,1907
Bethlehem Steel	9	.....	April 3	14,862,000		.....	.....
Bethlehem Steel pr	23	.....		14,908,000	7 n. c.	¾ Q.	Feb., 1907
Cambria Steel	27⅝	+2⅛	March 20	45,000,000*	6	1½ S. A.	Aug.,1907
Cambria Iron	42	+2		8,468,000*	4	2 S. A.	Apr.,1907
Chicago Pneumatic Tool	25	.....	Feb. 19	6,146,800	4	1 Q.	Oct., 1907
Colorado Fuel	20⅝	+3¼	Oct. 22	34,235,500		3½	Apr..1902
Crucible Steel	6	.....	Oct. 17	24,578,400		.....	.....
Crucible Steel pr	55¾	.....		24,436,500	7 cum	1¾ Q.	Oct., 1907
Empire Steel	5	.....	Feb. 28	2,281,400		.....	.....
Empire Steel pr	50	.....		2,500,000	6 cum	3 S. A.	July, 1906
Fay & Egan	100	.....	Feb. 20	1,000,000	6	1½ Q.	July, 1907
Fay & Egan pr	128¾	.....		1,000,000	7 cum	1¾ Q.	Aug.,1907
General Electric	116	+1	May 15	65,167,400	8	2 Q.	Oct ,1907
Harbison-Walker	14½	.....	Jan. 22	18,000,000		½	Oct., 1907
Harbison-Walker pr	69½	.....		9,600,000	6 cum	1¾ Q.	Oct., 1907
International Pump	11½	— ½	June 5	17,787,300		1	Apr.,1905
International Pump pr	57⅛	.....		13,335,000	6 cum	1½ Q.	Aug.,1907
Lackawanna Steel	25	—2	March 14	34,971,400		.....	.....
Lake Sup. Corp	5	.....	Oct. 3	40,000,000		.....	.....
New York Air Brake	70¼	+6¾	June 21	10,000,000	8	2 Q.	Oct., 1907
Niles-Bement-Pond	130	.....	Feb. 7	5,000,000	6	1½ Q.	Dec., 1907
Niles-Bement-Pond pr	105	.....		2,000,000	6 cum	1½ Q.	Aug.,1907
Otis Elevator Co	20	.....	March 19	6,375,500		1½ S. A.	Oct., 1907
Otis Elevator Co. pr	88	+3		6,449,500	6 n. c.	1½ Q.	Oct., 1907
Penn. Steel	50	.....	May 14	10,750,000		.....	.....
Penn. Steel pr	90	.....		16,500,000	7 n. c.	3½ S. A.	Nov.,1907
Pittsburg Coal Co	10¼	+2¼	Feb. 10	28 297,600		.....	Nov., 1906
Pittsburg Coal pr	44½	+2⅝		27,246,800	7 c.	3½	Apr., 1905
Pressed Stl. Car	21	+2⅝	Feb. 21	12,500,000		3	Aug., 1904
Pressed Stl. Car pr	69¼	+3		12,500,000	7 n. c.	1¾ Q.	Nov., 1907
Pullman	148	+10	Nov. 14	100,000,000	8	2 Q.	Nov., 1907
Railway Stl. Spring	30	+4½	March 1	13,500,000	4	2 S. A.	Oct., 1907
Railway Stl. Spring pr	76	.....		13,500,000	7 cum	1¾ Q.	Sept.,1907
Rep. Iron & Steel	17½	+ ½	Oct. 17	27,191,000		.....	.....
Rep. Iron & Steel pr	70	+9		20,416,900	7 cum	1¾ Q.	Oct., 1907
Sloss-Sheffield	38	+3¾	March 6	10,000,000	5	1¼ Q.	July, 1907
Sloss-Sheffield pr	80	.....		6 700,000	7 n. c.	1¾ Q.	Oct., 1907
Tenn. Coal & Iron	100¼	.....	May 7	29,500,000	4	1 Q.	Nov., 1907
U. S. Pipe & Fdy	22⅞	+4⅜	June 27	12,500,000	4	1 Q.	Sept.,1907
U. S. Pipe & Fdy. pr	58	+7		12,500,000	7 n. c.	1¾ Q.	Sept.,1907
U. S. Steel	27¼	+1⅜	April 16	508,302,500	2 n. c.	½ Q.	Sept.,1907
U. S. Steel pr	88	+1⅞		360,281,100	7 cum	1¾ Q.	Nov., 1907
U. S. Steel 5's	84½	+1		463,798 000	5	5 A.	.....
Va. Iron, Coal & Coke	40¼	+2	Sept. 18	8,641,600		.....	.....
Westinghouse Elec	47½	+7½	June 27	24 998,700*	10	2½ Q.	Oct., 1907
Westinghouse Air Brake	133	.....	Oct. 2	11,000,000*		5 Q.	Oct., 1907

Par value of shares, $100, except those starred (*), $50.

NEWS FROM MANY INDUSTRIES

New Buyers:—

The Defiance Pressed Steel Co., Defiance, O., has been incorporated by W. H. Becker, J. A. Donaldson, Frank Seither and C. C. Hoffman with a capital of $300,000.

Dwight D. Willard, Frank Toomey, Herman L. Winter have organized the Cathcart Coupling Co., Camden, N. J., with a capital of $100,000. The new company will manufacture shaft couplings.

The Empire Engine Co., Camden, N. J., machinist, founder, etc., capital $50,000, has been formed by Anthony Fricker, Andrew E. West and George W. Hite, all of the address given above.

The Economy Steel Mfg. Co., 1234 Monadnock block, Chicago, capital $10,000, has been organized to manufacture steel and steel products by George Heidmann, J. W. Witherspoon and Karl Kinsman.

George Dearborn, John A. MacPeak and William F. Eidell have organized the Standard Laundry Machinery Co., Camden, N. J., with a capital of $100,000. The company will manufacture laundry machinery.

The Martin & Ogden Co., Boston, wrenches, has been formed with a capital of $50,000. The officers of the company are: President and treasurer, Louis H. Ogden, Boston; clerk, William C. Martin, Mansfield.

Orrington C. Foster, A. C. Field and Frank Crozier have chartered the Power Equipment Co., 938 Monadnock block, Chicago, with a capital of $10,000. The company will manufacture electrical and heating equipment.

Peter L. Robertson, George Harvey, Stephen Agar and others have obtained a charter of incorporation as the P. L. Robertson Mfg. Co., Ltd., of Hamilton, Ont., with $250,000 capital, for the manufacture of screws, tacks, etc.

The Stratford Mfg. Co., Ltd., has been organized to manufacture articles of wood and iron at Stratford, Ont., with a capital of $40,000. Allen P. Boyer, Eugene F. Arnold and W. E. Schwartz are provisional directors.

The Thatcher A. Parker Co., Terre Haute, Ind., has been chartered to manufacture and sell structural iron and steel, with a capital of $50,000. The directors are: Thatcher A. Parker, Warren Hussey and William B. Hice.

The Acme Smoke Consumer Co., Indianapolis, has been organized with a capital of $20,000 and will manufacture and install smoke consuming devices in that city. The directors are: William J. Harris, O. J. Conrad and E. N. Hamilton.

The Williams-Lloyd Machinery Co., Adams Express building, Chicago, has been chartered with an authorized capitalization of $25,000 to manufacture printing and engraving machinery by Jacob Reichenbach, Graham S. Blair and Alvin W. Wise.

The Reliance Boat & Machine Co., 113 Fullerton avenue, Chicago, has been incorporated to manufacture motor boats and gasoline engines. The capital stock of the company is $10,000, and the incorporators are: D. A. Matot, L. Kirchenbauer and Joseph Matot.

With a capital of $200,000 the Duplex Sheet & Plate Co., Boston, has been organized to manufacture metals. The officers of the company are: President, William B. Arnold, Newton; treasurer, Chester T. Greenwood, Boston; clerk, Chester S. Merrill, Boston.

The U. S. Rocking Grate Bar Co., Great Northern building, Chicago, has filed articles of incorporation to manufacture smoke preventing devices and boiler appliances with a capital of $2,500. The incorporators are. John J. Moroney, A. M. Hopkins and H. S. Hopkins.

The Denton Woven Wire Fence Co., Denton, Tex., has been formed with an authorized capital of $30,000. The officers of the company are: G. H. Blewett, president; J. B. Schmitz, vice president; L. L. Fry, secretary; J. C. Coit, treasurer; T. K. Blewett, manager, and F. F. Hill, attorney.

The Calumet Iron Works, New York, has been chartered with an authorized capitalization of $20,000. The directors are: Charles V. Hesselbach, 403 West Twenty-first street; Henry S. J. Flynn, 200 West 118th street, New York, and Louis M. Hesselbach, Hamburg place, Newark, N. J.

The Corning Motor & Engine Co., Corning, N. Y., has filed articles of incorporation to manufacture motors, engines, etc. The capital stock of the company is $50,000, and the incorporators are: Charles C. Clark and Merrill S. Baker, Corning, N. Y., and Laverne J. Johnson, Jamestown, N. Y.

Articles of incorporation have been filed by the Phillips Gasoline Engine & Motor Co., Tacoma building, Chicago, to manufacture engines, motors, boilers and generators. The capital stock of the company is $12,000, and among those interested are: Irving M. Phillips, J. R. Hansen and E. G. Lancaster.

The Artistic Bronze Co., Norwalk, Conn., has been incorporated to make and deal in brass and bronze fittings, fixtures and furnishings. It has a capitalization of $20,000. The incorporators are: William C. Babson, South Orange, N. J.; Paul Syabo, Brooklyn, N. Y., and Gordon Grand, East Orange, N. J.

Articles of incorporation have been filed by the Stiegelmeyer Train Control Co., Indianapolis, Ind., which will take over the business of the Automatic Train Control Co., organized several months ago with a capital of $750,000. The company will manufacture a mechanical device for preventing wrecks on railroads. The directors are: J. E. Stiegelmeyer, Caney L. Smith, O. W. Beckwith, William E. Haywood and Charles E. Anderegg.

The Worswick-Haardt Harvester Co., Montgomery, Ala., has been formed with a capital of $300,000 by J E. Worswick, George P. Haardt, A. N. Kennedy and others to manufacture cotton harvesting machinery and implements, motors, tools, etc.

New Construction:—

George Smith, Sturgis, Mich., is having plans prepared for the erection of a machine shop at that place. It is expected that work will begin in the spring.

The Oklahoma City Implement & Mfg. Co., Oklahoma City, Okla., recently organized, reports that it does not expect to do anything definitely in the way of providing a plant for six months.

A partnership consisting of J. E. Hansen, A. B. Wesman and others has been formed at Austin, Minn., to operate a general machine shop. The contract has already been awarded for the erection of a plant 24 x 60 feet, two stories high, for the firm.

O. E. Norquist, Oakesdale, Wash., is at the head of a movement to erect a foundry, machine shop and boiler shop at Coeur D'Alene, Idaho. Mr. Norquist is conferring with the commercial organization of Coeur D'Alene and is desirous of obtaining three acres adjacent to the water front.

The J. W. Paxson Co., Philadelphia, manufacturer of foundry facings,

supplies and equipment, states that the additional real estate, to which it recently took title, has been owned by it for a year past, and it does not anticipate that building will be commenced immediately. J. K. Bougher is president and general manager.

R. L. Beasley, Gordon, Ala., patentee and manufacturer of stump pulling and pile driving machinery, is endeavoring to organize a company to erect or buy a foundry and machine shop for the manufacture of his inventions. His stump-pulling machine is operated by a 10-horsepower double cylinder hoisting engine, running on a frame to resist a strain of 125,000 pounds.

Sufficient stock has been subscribed by the residents of Phelps, N. Y., to insure the rebuilding of the plant of the Zenith Foundry Co., which was destroyed by fire recently. A larger and more complete plant will be erected. Until the new buildings are ready for occupancy, the company is making arrangements to temporarily manufacture its products at the plant of the Crown Drill Works.

The G. M. Yost Mfg. Co., Mechanicsburg, Pa., manufacturer of vises, has found that its business has increased to such an extent as to necessitate the considerable enlargement of its facilities. The company has, therefore, decided to move its plant to Meadville, Pa., where a new factory building is now in the course of erection. It is expected that this will be completed about March 1, and that at that time the entire equipment will be moved from Mechanicsburg and installed in the new plant. The company contemplates the adding of about $5,000 worth of new tools to its equipment. At the present time no foundry will be erected. The main office of the company will be located at Meadville after the occupancy of the new plant. The company states that the business depression thus far has not affected it to any extent, and that it has plenty of unfilled orders on its books. I. E. Yost is president, G. M. Yost, vice president and general manager, and T. J. Kennedy, secretary and treasurer.

General Industrial Notes:—

At the annual meeting of the Alabama Consolidated Coal & Iron Co. the retiring directors were re-elected.

W. J. Holloway, formerly of Fort Worth, Tex., is equipping a modern foundry plant at Stamford, Tex. The foundry will be operated under the name of the Stamford Iron Works.

An increase has been made in the capital stock of the recently organized Hines Mfg. Co. at Portland, Ind., and the company will soon begin the manufacture of a sectional metal oil derrick.

The Pittsburg Malleable Iron Co., Pittsburg, has made the necessary changes and repairs to its plant necessitated by the recent fire, and is again in first class running order.

The Central Machine & Metal Co., Mobile, Ill., recently incorporated, manufactures dies for sheet metal stamping and special sheet metal working machinery. Intricate work is the company's specialty.

The Zeh & Hahnemann Co., Newark, N. J., recently incorporated, succeeds the firm of Zeh & Hahnemann, manufacturers of presses, dies and sheet metal working machinery. No changes in the firm are contemplated and the management remains in the same hands.

The seven 45-ton steam shovels under contract with the Bucyrus Co., Milwaukee, have been delivered on the Isthmus of Panama and are being erected as fast as possible. There remain to be delivered on outstanding orders, 14 70-ton shovels and 16 95-ton shovels. When these shovels are put in commission there will be a corresponding increase in the yardage.

The Level Land Reversible Plow Co., Chetek, Wis., recently organized, has contracted with the Northwestern Steel & Iron Works, Eau Claire, Wis., to manufacture its walking reversible and sulky plows. Later the company expects to own and operate a plant of its own. George Hewitt is president and manager, and Leroy Colbert, secretary.

The Westchester Appliance Co., Yonkers, N. Y., has been organized to succeed the Willyoung Appliance Co., manufacturer and dealer in standard automobile accessories, such as spark plugs, spark coils, dry batteries, etc. The company has taken over the plant in its entirety of the Willyoung company at Yonkers, and has a finely equipped factory. No additional building will be done at present, although prospects for increasing the business are very good. Horace C. DeLisser is president; A. R. Gormully, vice president; F. E. Chapman, secretary and general manager; and J. W. Wellington, treasurer.

George I. Whitney, president of the Whitney Co., of North Carolina, one of the largest water power companies in the country, has resigned and has been succeeded by Edward F. Buchanan, formerly vice president. Other changes include the resignation of J. B. Finley, S. C. Ritchie, J. B. McClelland, A. W. Herron and F. L. Stephenson, and the election in their stead of G. L. Stout, L. C. Young, W. D. Sargent, J. S. Henderson and A. O. Brown. The Whitney Co., of North Carolina, which expects to be in full operation next summer, is developing about 50,000 horsepower on the Yadkin river, near Salisbury, N. C., in the center of an active manufacturing district.

The Fort Wayne Electric Works, Fort Wayne, Ind., reports that it has purchased all the equipment necessary for the new brass foundry which it is erecting.

At the annual meeting of the stockholders of the Connellsville Machine & Car Co., Connellsville, Pa., the old board of directors was re-elected, as follows: James McGrath, Charles Davidson, J. W. Ralston, L. P. McCormick, W. E. Crow, W. F. Soisson and Charles F. Hood.

The Akron Brass & Bronze Co., Akron, O., recently incorporated, has been on operation for practically eight months as a partnership. A state charter has been procured with the intention of carrying on a general jobbing foundry, with the exception of three specialties which the company is now working on. Sufficient work is at hand for six months' operation.

Trade Notes:—

A second Newten cupola, purchased from the Northern Engineering Works, Detroit, has been added to the foundry equipment of the Lombard Iron Works, Augusta, Ga.

Fires:—

The machine shops of the Santa Fe railroad, Topeka, Kas., were damaged by fire to the extent of about $10,000, Nov. 28.

The machine shops of the Littleton Tool Co., Littleton, W. Va., sustained a loss of about $50,000 by fire Nov. 27.

The structural steel plant of the Kelly Bros. & Mitchell Co., Winnipeg, Manitoba, were destroyed by fire Dec. 1, with a loss of $10,000.

The paint shop of the Pullman Co.'s plant at Buffalo was heavily damaged by fire Dec. 2. The loss is estimated upwards of $250,000.

The hammer shop of the locomotive department of the New York Central & Hudson River Railroad Co., West Albany, N. Y., was destroyed by fire Nov. 30, incurring a loss estimated at $25,000.